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TELEPHONE ENGINEERING.

Paper read at the 204th meeting of the American Institute of Electrical Engineers, New York, February 23, 1906, by J. J. CARTY.

ENGINEERING may broadly be divided into two classes, civil and military. Military engineering is that which pertains to the conduct of war and is sufficiently understood to require no description. Civil engineering, as I am now using the term, comprehends all forms of engineering which are conducted without special reference to the operations of war. Falling within this definition of civil engineering we have electrical engineering, mechanical engineering, telegraph engineering, telephone engineering, and some others. As taught in colleges, however, and as generally understood, civil engineering is restricted and deals more especially with that branch of the art which pertains to the construction of bridges, waterworks, railroads, harbour improvements, and other public works of like character.

Inasmuch as the telephone is an electrical instrument, and inasmuch as electrical phenomena exert a dominating influence in the telephone art, telephone engineering is classed as a branch of electrical engineering, although it will be shown as I proceed that telephone engineering comprehends important elements not at all electrical in their character; indeed, it is a recognition of the existence of these elements and a knowledge of how to deal with them adequately which constitutes one of the important requirements of telephone engineering. A good knowledge of electrical laws and a fair acquaintance with electrical machinery may be gained in our electrical schools; and graduates from them are, as a rule, proficient in these matters.

Telephone engineering comprehends not only these, but other factors, the existence of which is not generally recognised. In this paper I shall, owing to the limitations of the time at my disposal to-night, attempt to explain the nature of only some of these factors, indicating their most important bearing upon the general subject. From your own knowledge you will be able to supply many more instances, illustrating, perhaps, better than those which I have chosen, the ideas which I wish to make plain.

To describe the proper scope of telephone engineering in its relation to the telephone industry is to consider the function of the telephone engineer. Not so many years ago it was thought that the functions of the telephone engineer consisted of doing little more than to provide and install switchboards. He was supposed to be consulted occasionally about the station apparatus, and later, when cables were introduced, his activities were extended so as to include the testing of cable after it had been bought and laid.

At the time of which I speak telephone companies took almost an exclusively switchboard view of the telephone business. A building would be selected by someone connected with the company and the engineer would be consulted principally as to the selection of the switchboard and the placing of it in position. The size and location of the building, its relation to the existing and probable future subscribers, and all of the vast number of other factors now considered so vital in determining such matters received but scant consideration. So it was with cables; whether the cables should contain wires of No. 22, No. 19, or No. 16 gauge; whether the insulation should be of cotton, rubber, or gutta percha—these were questions which were as likely to be settled by the purchasing agent as by the engineer.

To one acquainted with the conditions of those times this is not at all surprising, because the telephone engineer of that period shared with all the rest of the world the prevailing ignorance concerning matters which they have since been proved by laborious investigations to be governed by well-established laws, the nature of which was then unknown.

The proper status of telephone engineering and the true scope of the functions of the telephone engineer differ as greatly from this primitive view as does the modern telephone system differ from that which obtained in the period about which I have just spoken.

I shall endeavour to give a correct view of the true scope of telephone engineering, and to do so I shall broadly discuss a typical problem in telephone management, illustrating the various points I wish to make by reference to certain details which will be considered in connection with the problem chosen.

Let us take the case of New York city, with the suburban territory tributary to it, and assume that it is the intention of the telephone company to install within that territory a telephone system which will work at a proper degree of efficiency and at the same time yield to the investor a fair return upon his investment; and that it is necessary not only that this condition should exist during the first stages of the project, but that the undertaking should be so managed that this condition will be maintained indefinitely. With such a problem before the telephone management, what part of it should the management require the telephone engineer to work out? I shall answer this question by describing in general terms, and sometimes for the purpose of illustration in considerable detail, what should be the work of the telephone engineer in such a case.

The first question which the engineer must decide is, what is the period for which such construction as may be required should be planned? This is a question of far-reaching importance and requires for its answer that a vast amount of data should be collected, and that careful and long-continued study and investigation should be given to a large number of factors, involving, among other things, first cost and character of construction of the diverse portions of a plant of such complicated nature, annual charges such as maintenance, depreciation and interest, and local conditions bearing upon the possibility of the renewal or extension at some future time of all of the elements of the plant.

In addition to this, due regard must be paid to possible changes in the art and also the fact that, owing to the exigencies of the business, many cases arise where it is necessary to carry out at the beginning, especially in underground work, all of the construction which may ever be needed.

At the outset the question of the period for which to plan depends upon the expectations of growth. With a given expectation of growth, the engineer, by taking into account all of the factors of the case and balancing the annual charges resulting from the initial investment against the cost of reconstruction and re-arrangement of the plant at some future time, arrives at the economical period for which to plan.

In this work the predictions as to growth are of the first importance and, inasmuch as accurate predictions of this kind are attended with the greatest difficulty, it is essential that not only the judgment of the engineer, but that of the business management and all others who might be able to advise in connection with the matter, should be obtained.

At this stage of the work it is of the utmost importance that the bearing of these estimates of growth upon the future of the

plant should be thoroughly understood by the business management, whose functions, in the nature of the case, exercise such a profound effect upon the extent and character of such growth. It is the duty of the engineer to make this point clear and to obtain from the business management serious and responsible estimates of future growth.

The number of lines which may be expected having been agreed upon, the question of for how long a period ahead we should plan is determined by a number of circumstances. For such conditions as obtain at New York, the period for much of the construction has been found to be from seventeen to twenty years. This figure is arrived at by taking into account a large number of factors, such as life of the central switchboard—which is placed at about fifteen years, the relative costs of placing in the conduits a large number of ducts initially as compared with adding new ducts after a period of about twenty years, the uncertainty regarding the changes in the state of the art, and the difficulty of foretelling with sufficient detail conditions which are expected to obtain during a period so far ahead as twenty years.

In the case chosen for illustration, which was New York, the economical period was found to be about twenty years, and it was attempted to plan for conditions which would obtain in the year 1920 and for each year up to that date. The total number of lines to be provided for in the Island of Manhattan is 300,000. The working out of the general plans for providing for this number of lines, which it was expected would be reached by the year 1920, constitutes what is known as the "300,000-line study." To give an idea of the nature of part of the work of the telephone engineer, I shall outline in general terms the character of this study.

Having determined upon 300,000 lines as the proper foundation of the study, and having received the proper authorisation from the business management to proceed on that basis, the next step is to plot on a map the probable distribution of these lines. This is done, not by giving the location of each line, but by indicating by blocks the most probable distribution. Here again the judgment of the engineer must be assisted and directed by the business management, for next in importance to determining the total number of lines to be provided for comes the question of their distribution.

The number and distribution of lines having been agreed upon, the next step is to determine the number and arrangement of central office districts, the size and boundaries of these districts, and the size and location of the central office switchboards.

It is conceivable, although obviously impracticable, that all of the 300,000 lines might be extended to one central office and operated in switchboards there; it is only necessary to state such a proposition to exclude it from further consideration. On the other hand, it is conceivable that a central office might be established in each block; this also is absurd and needs no further consideration. Somewhere between these two extremes must lie the most economical size and number of central offices. The next stage in the problem is to determine this number; to do this no formula, simple or otherwise, is available. The only practical method is to lay out the territory to be served, in accordance with a number of different arrangements of districts and centres, starting in, say, with ten centres and extending the study up to as many as 30 or 40, or even more. In the case of all these arrangements there would be certain elements of cost which would not be changed by the different arrangements of central offices assumed. Block-wiring and station instruments are examples of these. These elements of cost are omitted from the comparison. All of the items of cost, however, which vary with the different number and arrangement of central offices are computed, all of these being reduced to annual charges.

From these figures, as applied to the various layouts, the number of central offices and the districts which are ideally most economical may be seen. I say ideally most economical for the reason that the practical application of such results requires that a difficult and very complicated adjustment of the existing plant, to conform as nearly as possible to the ideal condition, must be carried out.

While it must appear, even from the brief statement of the steps of the study thus far described, that a vast amount of labour and computation are involved, it by no means represents all that must be done. Before there can be made a comparison of the relative economies of the various groups of offices, a series of studies within studies must be carried out upon many other important elements of the problem.

The first of these is the switchboard study. Before the switchboard study can be made, general methods of operating must be agreed upon, such as the method of handling toll business, whether it shall be done wholly upon a toll board or partly upon a toll board and partly direct from "A" positions; whether it shall be done wholly upon a "two number" basis or substantially upon a "particular party" basis. The best method of handling local business must be determined. It must be decided whether the business shall be upon call wires or otherwise; what shall be the capacity of the call wire: what shall be the load which will be assigned to the various operators in the system, this in turn being dependent, among other things, upon the character of the service which it is thought necessary to render.

Having agreed upon these and other fundamental data, the question of the best type of switchboard, whether it shall be full multiple or partial multiple, whether it shall be of the transfer type or otherwise, must be settled. The limit so far as size is concerned of the multiple board, or any other type which may be considered, must be determined. Also there must be settled a very large number of questions cropping out at every point involving maintenance and operating expenses and methods. All of these factors having been duly weighed, the maximum size and type of switchboard is agreed upon.

The switchboard determinations having been made, the type of cable to be employed must be settled upon. Here again a series of studies is necessary. Of first importance in the cable study is the determination of the standard of transmission which is to be employed, not only for talk between offices within a zone such as Manhattan Island, but also the standard of transmission which it is necessary to maintain between Manhattan Island and the suburbs and between various points in the suburbs passing through Manhattan, and to long-distance points. The importance of this determination will appear when we consider the standard already adopted as the Manhattan standard, which is, assuming the use of the present common battery apparatus, that the cable employed in Manhattan shall at all times be such that it will give in the worst case a talk as good as could be obtained between two central offices joined by a trunk cable of ten miles of the standard type having the No. 19 gauge conductors, with a mutual capacity of 0·07. If this standard were lowered so as to employ the use of No. 22 gauge cable instead of No. 19, it would permit the use of a trunk cable costing half as much as that required by the present standard, thus reducing the number of ducts required and in that way profoundly affecting the results of the study.

In considering the type of cable employed, not only must the standard of transmission be borne in mind, but in determining upon the specifications for the various types of cable needed a long series of special studies is required. These are conducted with a view to determining upon that form of construction in each case which will give the highest standard of transmission and at the same time preserve the best mechanical conditions needed for hauling in and out of the duct, and also be so constructed electrically and mechanically as to require a minimum of attention from the maintenance point of view. Not only must the various types of cables be carefully fixed upon when considered strictly from the cable point of view, but where suburban and long-distance circuits are to be considered the problem of loading cables presents itself. This involves so much work and study that to give even a brief outline of what it involves would require a paper which itself would extend far beyond the limits of the time allotted for this very general statement of the case.

The general features of the study having been determined upon and the time having arrived to erect a given central office at a centre previously located, the question of obtaining the necessary real estate and erecting the central office building presents itself. In such cases it is usually impossible to obtain the desired property exactly at the ideal centre. Practical real estate conditions must be met, and of the various parcels of property offered that is chosen which, taking into account all of the circumstances of the case, results in the lowest annual charges. The distance of a given site from the main conduits, the character of the neighbouring buildings, the price at which the property can be obtained, the possibility of

reconstructing the existing building which may be upon the property or the necessity of removing it and erecting a new one, and other similar points—all these have to be carefully worked out before a report can be made to the management setting forth the most economical land to purchase.

In other words, before even the land is bought a study must be made of a telephone building which might be erected upon it. Inasmuch as in nearly every case many different properties must be considered, studies for several different buildings must be carried out before the best combination can be determined. After these matters have been decided upon, the details of construction of the building must be further studied. This, as can readily be understood, naturally involves a vast amount of engineering work.

Thus far I have hastily sketched the outlines of a telephone development study as it is more particularly concerned with the local plant but as the local plant must be, as time goes on, more and more intimately connected with neighbouring plants in the suburbs, and with more distant plants reached by long-distance wires, most careful study must be given to the best methods of establishing proper relations with those plants.

Without attempting to outline in any detail the nature and extent of the work involved in the methods employed in making a suburban toll-line study, and without going at all into the question of methods of establishing the service to long-distance points, I will say that, considering the broad features of these various classes of conditions, it has been found best, in the particular case which I have taken for my example, to divide the telephone business into three classes—local, suburban, and long distance.

In determining what shall constitute the local class the engineer finds himself engaged in a problem of great magnitude which primarily concerns the business management and which is affected by important public and economic considerations as well as by engineering factors and methods. If the local zone is made too extensive it greatly increases the magnitude of the trunk line plant from which no toll revenue can be derived. This fact reacts upon the rates in such a manner as to make it impossible to give as low a station rate as might otherwise be the case. This tends to restrict the growth of stations and hence will act as a check upon the growth of the business at large.

The local zones having been determined upon, it must next be decided what shall be the limits of the suburban business and what shall be classed as long-distance business. Without attempting to explain the various points necessary to be taken into account in determining these questions, I will say that they involve not only those physical factors ordinarily considered to constitute engineering, but that they involve the methods of calling which may be permissible on the part of the subscriber, the entire system of toll rates which may be adopted by the telephone company, the question of whether the subscribers' names and numbers should be listed or not, and other questions of this nature.

When I review the outline of the methods and magnitude of a telephone development study, such as I have here briefly sketched, I am not surprised that some who superficially consider the subject are inclined to doubt the value of results obtained in this way. This feeling is strengthened when they consider the nature of some of the fundamental data upon which all of the work rests. For instance, unless there is made a fairly correct forecast of the probable growth of subscribers' lines for a period of fifteen or twenty years in advance, it is clear that substantial errors will be made; but more than this, it is necessary not only to forecast the total number of lines expected, but their location must be determined within close limits. But this is by no means all. Not only must the location of the lines be decided upon, but the number of calls per day which may be expected over each line must be estimated; not only must the number of calls which are expected be correctly determined, but the time of the day during which these calls may be expected must be arrived at in some manner. Even more than this must be done, because it is necessary not only to know all of these facts, but also it must be known where the calls are to go. We must also know what proportion of these are likely to be toll calls, what proportion long distance calls, and various other factors of like nature must be determined.

There can be no doubt that telephone development, as thus viewed, and as correctly viewed, presents abundant opportunities for errors, and that such errors must lead to expenditures of large sums of money, which, if infallible data were obtained, would not be required.

But conceding all this, what is the alternative method which we can follow? If we are to abandon the method of study herein described, what shall be substituted for it? By what plan shall we proceed which will enable us to arrive at a more economically constructed system? What method shall we adopt which will enable us to proceed without answering such questions as those which the present method of study undertakes to answer? It is obvious that what are erroneously called "common-sense" methods might be employed. Buildings might be erected in various locations in a city, chosen after an inspection of the region; they might be substantially constructed and provided with switchboards. These buildings might be joined together by conduits, and in the conduits cables could be located. Suburban and long-distance trunk line conduits might also be constructed, and there is no doubt that, according to such a plan, telephone business could be carried on. But have we, after all, in following this method, avoided answering any or all of the questions with which the study undertakes to deal? Most certainly we have not, and while it might not be appreciated, every step taken in this so-called common-sense method really makes a direct, though unconscious and unintelligent, answer to all of the questions propounded and dealt with in the formal study. If, following this common-sense method, it is decided to erect at a given location a central office building with a switchboard of a given size, this office must be intended to serve a district of some definite form. If, as would of course be the case, other central office buildings are erected at other locations, they, too, must be constructed with reference to fixed districts, and their number must be determined with reference to the expected growth in subscribers; so that, after all, the magnitude of the expected growth is a factor which is unconsciously dealt with. But in determining upon the size of the switchboard and its construction, whether we realise it or not, a definite, though unwitting, answer is made to the questions of what shall be the rate of calling, what shall be the destination of the calls, what shall be their character, and at what time they shall occur. The switchboard and building must be planned for some set of conditions which can be established only by data of this character. Merely ignoring these questions and erecting the switchboard and arranging central offices without making a study, does not avoid answering the questions, for by the construction carried out a direct and unequivocal answer to all of these questions is made, yet without giving consideration to any of them or even recognising their existence.

So it is with conduit construction. It is easy enough, after central offices have been located, to plan for a conduit joining those offices, but somebody must answer the question of how many ducts shall be provided in this conduit. This can be done by the method outlined in describing the study, or it can be determined at the time by somebody who is opening the streets. It may be done, on the one hand, by engineers after careful study with all the facts before them, and after having analysed the statistics of the past and having exhausted all possible methods of throwing light upon the subject; or it may be done by a man in the street with a pick-axe. Those who would follow the pickaxe method would not avoid questions which the engineer has recognised and has undertaken to answer. They would, by the number of ducts they put down, and by the character and magnitude of the other construction, give their answer to all of these questions without having considered any of them. As to which of these two methods should be followed, the telephone company must decide.

Thus far in my outline of that part of the telephone engineer's duties which pertain to development studies, I have dealt more particularly with the physical features of the work. Ordinarily, engineering has to do principally, if not exclusively, with physical factors, but telephone engineering has not only to deal with physical factors of the utmost complexity, but it has also to deal with commercial questions, which, of themselves, would seem to be only remotely connected with the work of the telephone engineer, but which really vitally affect it. Telephone engineering presents more factors of this nature than, I think, are to be found in many other branches. Take the case of a civil engineer who has before him the problem of constructing a masonry dam. This presents an

instance involving solely physical factors. The stability of the dam, or its capabilities of impounding the necessary amount of water are in no way affected by any action which the board of directors of the waterworks company may take with reference to its dealings with their customers.

It is not so with telephone engineering, for, as I will presently show, a telephone toll line and switchboard system might be designed in accordance with the highest state of the art and constructed so as to give the best efficiency, and yet by the action of the business management, causing the adoption of what might seem to be a reasonable commercial practice, the operativeness of the switchboard system might be totally destroyed. This idea will be readily comprehended when we consider what would happen to the present toll board at Cortlandt Street, operating on the recording basis, using the two-number method of calling, if, by some change in business plans, the particular party method in use extensively in many other localities were adopted. Only a brief consideration of this case is required to show that, in addition to the present recording operator, a second set of operators would have to be employed, who would be required to call up the subscriber desiring the toll connection and obtain from him the details of his call. The adoption of such a method, while in itself a wasteful and inefficient one, would, in the case I have chosen, require the radical reconstruction of our entire toll-board plant. More than this, the adoption of such a method would render it impracticable to follow the direct-line trunking method, which is now possible by the use of the two-number plan of calling. The abandonment of this method would require that such toll lines be handled from toll boards. The magnitude of the revolution which this would make in the engineer's plans will be seen when I say that whereas, by the two-number method, one toll board occupying one floor of the Cortlandt Street Exchange is sufficient, there would be required, if the particular party method were employed exclusively, as many as five or six toll boards occupying five or six floors in the Cortlandt Street building, and requiring five or six times as many operators for their working. This is one of the best examples which could be given as showing the peculiar relation which obtains between telephone engineering and the business management of telephone companies.

Another example, perhaps even more far-reaching in its effect upon the work of the engineer, is the question of whether the telephone company shall charge for its service on the flat-rate plan, or by messages, as is now generally the case in this neighbourhood.

Under the flat-rate method of charging, in large cities, the more times the customer uses the telephone during the day the greater is the expense to the telephone company. This is due, not only to the increased number of operators required, but also to the increased switchboard sections needed for them, and to the increased trunk-line plant. By the method of flat-rate charging there is no motive for the telephone company to encourage an increase in the number of calls. For this reason a flat-rate plan would have to be so engineered, and the rate would have to be so established that extension stations, desk stands, and other auxiliaries, tending to make the use of the telephone easy, and, therefore, more frequent, must be discouraged.

The existence of the flat-rate in such cases would not only be attended by all of these consequences, but many others, one of which in particular is of great importance. I refer to the excessive use of the subscribers' line which such a rate engenders. The consequence of this excessive use is that the "busy" calls attain such serious proportions that it is difficult, if not absolutely impossible, to give satisfactory service. This trouble from "busy" calls has at times attained such serious proportions that engineers, in various places, have exerted extraordinary efforts to mitigate the evil, but without success. This difficulty having been caused by commercial methods could not be overcome by the engineer employing physical methods. The solution of this difficulty lay with the business management, and consisted in the adoption of a proper system of message rates. Once such a method was put into force all of these difficulties which I have enumerated as pertaining to the flat-rate, and many others which I have not taken the time to explain, disappeared.

(To be concluded.)

STATIONERY SUPPLIES.

THE NEW INDENT AND ITS PURPOSE.

By ERNEST E. IRONSIDE.

THE question of Stationery Supplies is, it is feared, regarded by many of the offices with much indifference—if one may judge from the large number of cases that come before Head Office of the unexpected discovery that supplies are exhausted—and is apparently usually relegated to a very junior official.

The fact that a failure to apply for the proper supplies at the proper time may mean dislocation of the work at the centre concerned, with consequent delay and additional expense or loss of revenue, is not sufficiently clearly realised in many quarters.

It was with the object of rendering all possible assistance to centres that the recently introduced continuous Indent for Stationery Supplies was provided. By reference to this record it is possible to supervise methodically the supplies of the official forms, books, and sundries needed. These form the commercial commissariat of the business, as indispensable as the supplies of an army on active service.

It is only by thorough efficiency that such a concern as ours can reap the full benefits of its vast opportunities; every article needed should be in its place when wanted, and this standard should be maintained without wasteful surplus supplies. This means in the present case material to work with, books, forms, all the many hundreds of small and comparatively inexpensive articles contracted for and distributed by the Stationery Office, but each having its place in the internal business economy of the Company's undertaking, and essential to its perfect working.

There is a valuable training to be obtained by any official who is entrusted with the duty of keeping up these supplies. The work calls for much discrimination, watchfulness, and spirit of economy. Neither too small nor too large a supply will give perfect results; any error in requisitioning a wrong article will mean wasteful delay and the omission of necessary particulars often has the same result.

These errors of judgment react in many cases on the affairs of other centres; when unnecessarily large or incorrect supplies are requisitioned Head Office stocks may be depleted, thus causing delay in dealing with requisitions from other centres.

Such bad results may be obviated by intelligently using the new indent, which, as it shows past consumption, will guide the supply official in framing present requisitions. Head Office is at all times ready to deal promptly with any emergency, but much of this emergency work has hitherto been due not to abnormal increase in business and consequent abnormal requirements, but to abnormal want of foresight and of care in watching the consumption on the part of the supply officials in many centres. These unnecessary emergency demands have been an unfair burden upon the staff at Head Office, and should now entirely disappear.

By bearing these points in mind, and so reaping every advantage from the improved facilities, a material improvement may be obtained in the efficiency of the supply departments throughout the service of the Company.

THE POLITE SUBSCRIBER.

THAT *rara avis*, the complaining subscriber—rapidly, we hope, becoming an extinct species—occasionally varies his diatribes by indulging in gentle sarcasm. One of the Company's District Managers recently received the following:—

As grateful recipients in the past of no inconsiderable favours at your hands, may I respectfully point out to you that the instrument in our Works Office is by no means in that high state of efficiency which we naturally look for in your telephones.

The past favours incidentally referred to above lead me to believe me that the complaint just mentioned will be removed at the earliest opportunity, once more laying us under an obligation which will be thankfully remembered, both by the writer and the Works Office staff in general.

The District Manager forthwith had searching investigation made into the complaint and discovered, among other things, that so far from being sarcastic the letter was intended to convey exactly what it expressed.

MUNICIPAL COMPETITION.

THE tables of station statistics below will be of general interest as they show the commanding position which the National system holds in all of the five centres where there is municipal competition. It was originally anticipated by the promoters of the municipal telephone systems that the National service would quickly be entirely eclipsed by the municipal service. A few years of actual trial have shown that the reverse is likely to be the case. At the present time the total National stations are more than double the total municipal stations in the five competitive areas, and the National gain for last year was nearly five times the total municipal gain. In Glasgow, where the competition has been most strenuous, and where the Corporation have spent an enormous sum of money on their telephone system, the National gain during the past year was almost ten times as great as the municipal gain.

COMPETITIVE AREAS. STATION STATISTICS, 1905.

TABLE A.—TOTAL STATIONS AND NET GAIN, 1905.

	National Stations.		Corporation Stations.		National Gain, 1905.		Corporation Gain, 1905.		National Excess, Dec. 31, 1905.	
	Jan. 1, '05	Dec. 31, '05.	Jan. 1, '05.	Dec. 31, '05.	Stations.	Per cent.	Stations.	Per cent.	Stations.	Per cent.
GLASGOW ...	18,957	24,682	12 002	12,599	5,725	30·0	597	5·0	12,083	96·0
HULL	4,669	6,108	1,100	1,670	1,439	30·8	570	51 8	4,438	265·0
BRIGHTON ...	2,414	4,059	1,618	2,010	1,645	68·1	392	24·2	2,049	102·0
PORTSMOUTH ...	2,378	3,392	2,004	2,353	1,014	42·7	349	17·0	1,039	44·0
SWANSEA ...	1 872	2,552	1,077	1,318	680	36·3	241	22·4	1,234	94·0
TOTALS ...	30.290	40,793	17,801	19,950	10,503	34·7	2,149	12·0	20,843	104·5

TABLE B.—SHOWING FALLING OFF IN CORPORATION GAIN. (Figures denote Quarterly Increase in Stations on each System.)

	GLASGOW.		HULL.		BRIGHTON.		PORTSMOUTH.		SWANSEA.	
	National.	Corporation.	National.	Corporation.	National.	Corporation.	National.	Corporation.	National.	Corporation.
1st Quarter ...	1,703	234	174	350	409	187	219	106	225	88
2nd ,, ...	1,567	126	539	120	406	116	286	94	192	37
3rd ,, ...	1,112	107	179	42	446	60	233	103	110	65
4th ,, ...	1,343	130	547	58	384	29	276	46	153	51
Totals ...	5,725	597	1,439	570	1,645	392	1,014	349	680	241

SUMMARY.

	Total National Gain.	Total Corporation Gain.
1st Quarter	2,730	965
2nd ,, ...	2,990	493
3rd ,, ...	2,080	377
4th ,, ...	2.703	314
	10,503	2,149

NEW INSTRUMENTS FOR OLD.

BY CHARLES E. FENTON, *Factory Manager, Nottingham.*

THE subject of handling used instruments by the staff in the districts is one which calls for special attention. It has a most important bearing on maintenance charges. I consider that all old instruments should be handled as carefully as new. Much expenditure would thereby be saved in general repairs, and in the renewal of the more expensive parts. Though of recent years there has been an improvement in this direction—and in some districts it is very marked—there is still much room for further improvement.

On an average 25 tons of old instruments are received each month at the factory from centres, many being in a most dilapidated state through rough usage. (See Fig. 1.)

At the present time 450 persons are employed in overhauling and repairing instruments and miscellaneous apparatus, accommodation being provided in two factories having a total floor

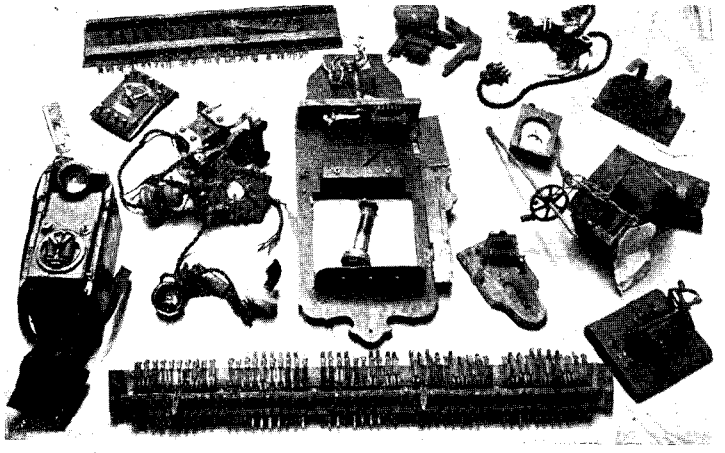

FIG. 1.—Specimens of instruments for repairs.

space of 45,000 square feet, divided up into different departments, as follows:—

Breaking up.
Mechanical repairing and assembling.
Plating and dipping.
Cabinet work.
French polishing.
Coil winding.
Lacquering and enamelling.
Cable forming.
Warehouse.
General stores.

Many processes are involved in dealing with the old instruments at the factory, and much labour can be saved in the preliminary stages by the strict observance of the Service Instructions on the part of staff in the districts.

An account of the methods employed should be both interesting and helpful to the staff generally.

The consignments are delivered by the carriers direct to the unpacking department, where the weights are checked, the condition of cases noted, and the details posted to the Carriers' Account in the book kept for that purpose.

The consignments in respect of which delivery notes have been received are unpacked, each one being dealt with separately, and the instruments are placed in special racks, compartments in which are allotted, for the time being, to each consignment. The instruments received are checked off with the delivery notes, and details are entered on the "Inwards Slips" together with our code, by which each class of instrument is identified.

Each instrument is then examined by a factory officer, in conjunction with the Engineer-in-Chief's Inspector. Those which are obsolete or beyond repair are transferred to the condemned stock, and are eventually dealt with by the breaking up department, where the useful parts are recovered, and the scraps metals sorted ready for disposal to the contractors. Instruments of standard types are transferred to the warehouse, where racks are provided for each description and pattern.

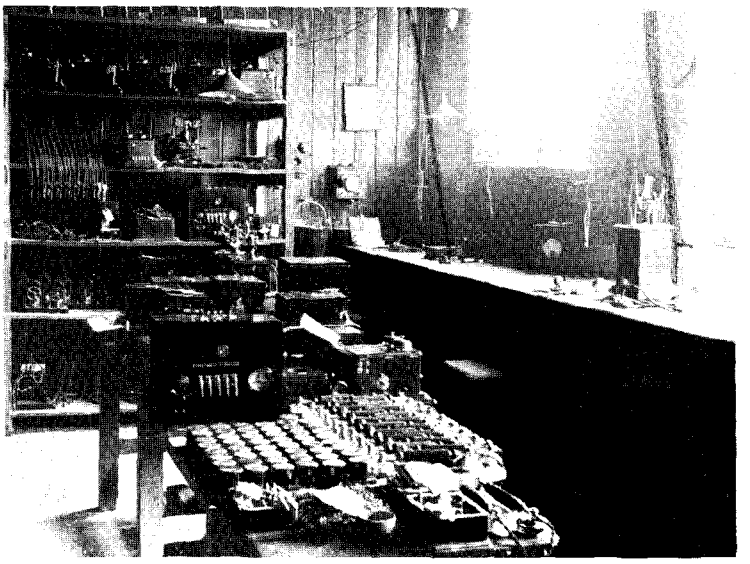

FIG. 2. A portion of the Engineer-in-Chief's Testing-room.

For the purpose of location, each rack has a separate number, while each shelf in the respective racks is numbered in consecutive order, and each compartment bears the letter code.

These numbers are entered on the ledger cards, which are filled in code order: it is then possible for a comparative stranger to locate any one of the 5,000 regular stock instruments or parts in the warehouses or stockrooms, which occupy a space of 12,000 square feet.

The instruments for which there is a regular demand are put in hand for repairs in lots of 100.

In the ordinary course it usually takes about a month to carry out the repairs to an instrument of the description of the Ericsson

FIG. 3.—French polishers at work.

wall set, as numerous operations are required in the various departments.

On receipt of a Works Order in respect of, say, 100 wall sets, the foreman obtains the instruments from the warehouse, and the

dismantling is carried out by a section of the staff accustomed to that branch of the work.

As each instrument is dismantled, the component parts of the case and the principal working parts are all marked in such a manner as to ensure the same parts being fitted together when the instruments are re-assembled. This is very necessary, as from various causes the parts are not generally interchangeable.

The various woodwork parts are collected together and are forwarded with a Transfer Order to the cabinet department for repairs.

Those metal parts which have previously been plated are repaired and sent to the plating department.

Parts to be lacquered or enamelled, and coils which require rewinding, are transferred to their respective departments.

The generators, ringers and sundry parts are handed to the repairmen for overhaul and repair.

When the final processes are completed in the various departments, the parts are returned to the department responsible for the finished instruments, where the whole of the parts are collected together, and the work is taken in hand by the assemblers, who requisition through the shop foreman to the stores department for parts to replace those which it may have been necessary to scrap.

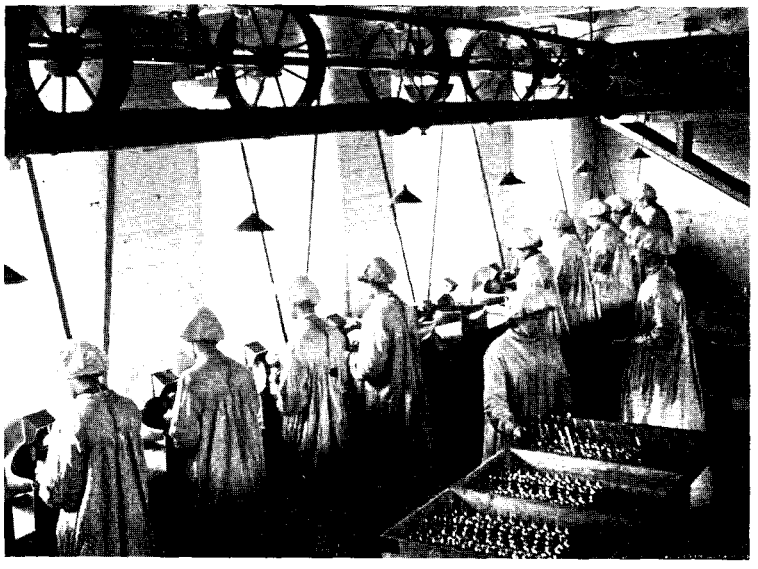

FIG. 4.—A corner in the Metal Polishing Shop.

On the completion of the instruments they are handed over to the Engineer-in-Chief's testing department (see Fig. 2) for examination; those passed are transferred to the packing room, where girls obliterate all finger marks, and wrap up the instruments carefully ready to be packed away for despatch to their various destinations.

Considerable time is occupied in passing the woodwork parts through the various processes in the cabinet and french polishing departments.

After the parts have been repaired by the cabinet hands they are transferred to the sandpapering shop, where the old polish is stripped from the flat surfaces, and the bruises taken out by means of a sandpapering machine with discs running at high speed; they are then finished off on a machine with an endless belt of fine-grade sandpaper.

The french polishers (see Fig. 3) then take the work in hand, performing operations known as filling in, bodying in, papering down, and spiriting off.

The "filler" is a special preparation for closing the pores of the wood, preventing the grain from rising. "Bodying in" is the process of applying the polish, and has to be performed two or three times at an interval of a day; otherwise the work will not be durable.

Between the "bodyings," the surface is smoothed down with fine glasspaper.

The final process "spiriting off," by which the gloss is put on the "body" previously applied, requires considerable care and experience; in this operation methylated finish is used.

The plant in the plating department consists of four nickelling vats, coppering vat, cyanide bath, tanks for hot potash, hot water

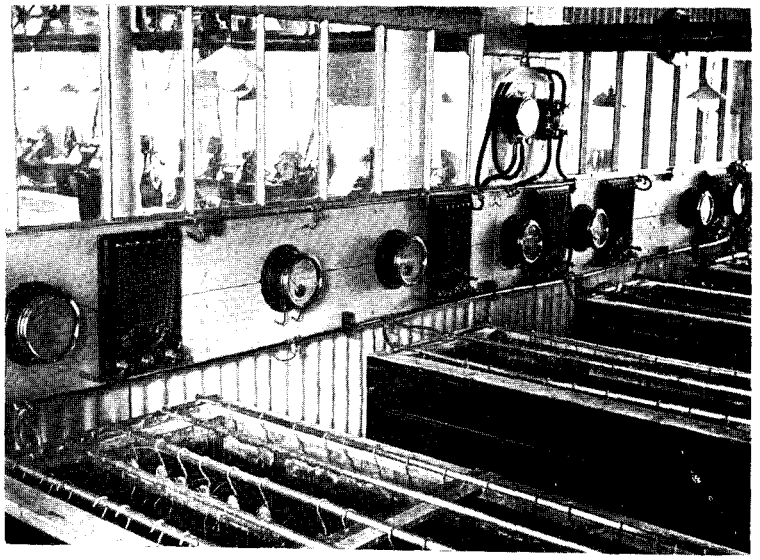

FIG. 5.—Nickelling vats.

box dust, and scouring troughs, also seventeen double polishing spindles.

Hoods of special design are fitted to the spindles, and are connected to large galvanised iron pipes, at the ends of which are fixed powerful exhaust fans. The latter draw off the dust created by the polishing process, and it is deposited in a cyclone and dust settling tank outside the building.

There are many interesting processes in this department; the first of these is stripping the old nickel from the parts to be plated, accomplished by dipping in *aqua fortis*, which requires careful handling. If the articles are kept in the acid too long, they are

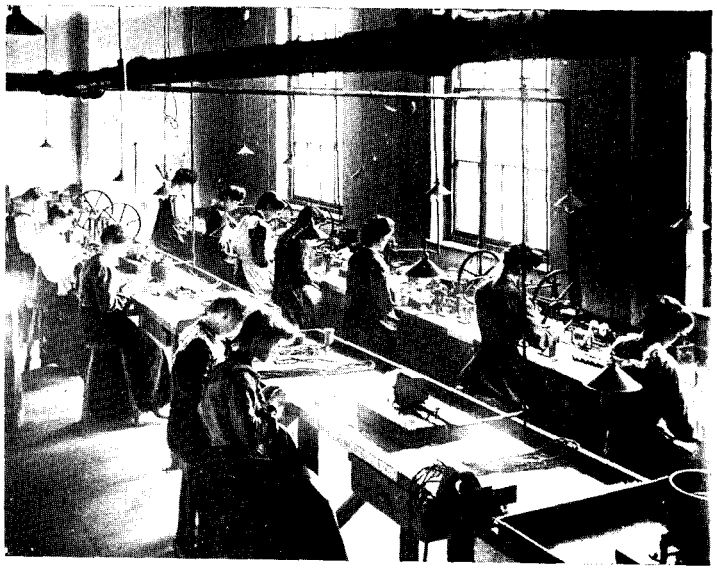

FIG. 6.—Re-winding coils.

burned, and considerable labour is afterwards involved in putting them right.

Polishing (see Fig. 4) is the next process; this is done by means of mops attached to the spindles, which are run at high speed; Tripoli composition (a mixture of tallow and beeswax) is applied to the mops.

The articles are afterwards wired up with 26 S.W.G. soft copper wire and are dipped in the hot potash to remove the grease; this is followed by a scouring process, rinsing in hot water, a dip in the cyanide bath, and a further rinsing in hot water. The work is then ready for the vats (see Fig. 5) where it remains suspended on brass rods until a sufficient deposit of nickel has been obtained.

The finishing process—colouring off—is carried out on the spindles.

On an average 35,000 parts and 250 gross of screws are dealt with each week, the work including coppering, bronzing, and matt finishing aluminium articles.

The coil winding shop (see Fig 6) is equipped with sixteen winding heads, thirteen of which are driven by power and the remaining three by hand for delicate work.

The effects of an electrical storm throughout the country are soon noticed in this department by the quantity of coils which pour in for "urgent repair and return."

There are four repairing and assembling departments (see Fig. 7), one each for the following:—Switchboards, wall sets, table sets, and sundry instruments, in which the different processes are specialised

For switchboard cable forming there is a shop (see Figs. 8 and 9) over 100 feet in length, which is fitted with benches for measuring off, lacing, soldering, and examination.

FIG. 7. Repairing and Assembling Department.

The waxing is done in a water jacketed tank, fitted with a basket for draining off. The cable butts are compressed with a machine vice of special construction.

The testing apparatus in use locates and indicates all conditions of faults, and is fitted with an automatic switching arrangement having several interesting features, an account of which will appear in the JOURNAL at a later date.

Wherever practicable our records are kept on the card index principle. For controlling costs, stock, stores on order, requisitions received, work in progress, promises of deliveries, and general records, I find the system invaluable.

At the forthcoming factory stock survey the records will as an experiment be made on 5-inch by 3-inch slips; this will, I anticipate, result in a saving of labour. The slips will be numbered in consecutive order, and a quantity will be handed to each stocktaker, who will have to account for all slips handed to him. Should a slip be mislaid the item which appeared on the slip can be easily ascertained, as each stocktaker has written instructions respecting the racks he is responsible for, and the order in which they are to be surveyed.

The stock ledger cards are filed in alphabetical code order and the survey slips will be arranged in similar order; consequently the task of compiling the stock sheets, even with 5,000 items, will be an easy one when compared with the book method, where many books have to be searched for one item.

Space will not permit me to treat fully of the advantages of the code system as applied at the factory to instruments, parts, and raw

FIG. 8.—Showing measuring off, lacing, soldering, and examination processes in operation in Cable Shop.

materials. Everything is coded, from a tintack to a fully equipped multiple section. For instance, the code for an ordinary table set, Ericsson pattern, is T.S.C. The first and second letters are the key to the description and the last denotes the type. The component parts are numbered and have the instrument code letters prefixed.

On the whole of the records the code is invariably used, and the staff are so accustomed to the system that in conversation it is generally unnecessary to refer to descriptions.

Many ingenious methods have been introduced by both past and present members of the staff in their endeavour to solve the problem of converting old instruments into new. In the execution

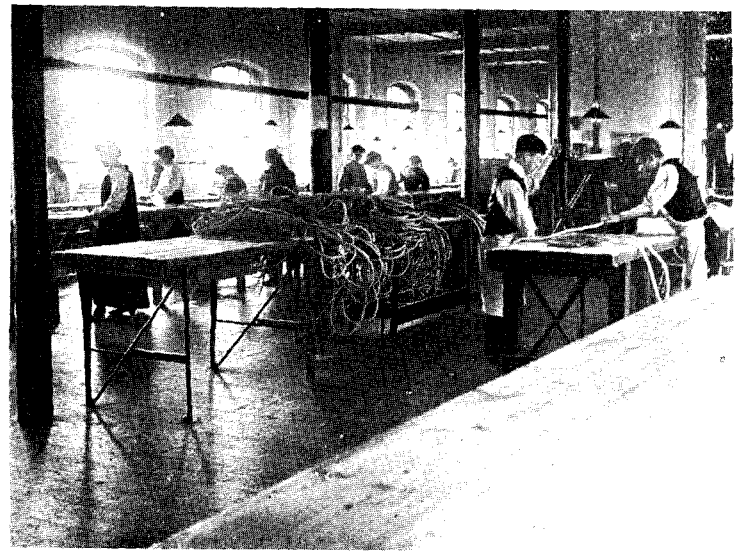

FIG. 9.—Compressing the cable butts in the machine vice.

of the work several departments are involved, and among them the cordial relations prevail necessary to ensure the best results. That the districts can co-operate with the factory by giving attention to careful handling of used instruments to be sent up for overhaul and repair, has already been hinted.

EXCHANGE CATERING COMMITTEES AND THEIR WORK.

By Florence J. Minter, *Examining Matron, Metropolitan Traffic Department.*

While the culinary department is comparatively little recognised, I think it must be conceded that it, after all, plays no small part in operating matters.

"Feed the brute!" we are told, if wives would wish for a good-tempered husband, who will overlook any delinquencies in the shape of spring toques or deficits in the housekeeping accounts; and it cannot be denied that a well-fed, healthy person, feeling at peace with all the world, is far more likely to do good work—and do it more cheerfully—than the dyspeptic individual who takes a crooked view of everything.

"The soft answer that turneth away wrath" cannot always be expected of an operator who has been economising on buns and coffee. We have improved on buns and coffee, and although we have not yet reached that ideal state of things of Pearce & Plenty's, "Everything as mother makes it"—which one operator actually implied she expected—I am satisfied that our lunching arrangements in London afford great advantages to the army of girls who constitute our operators, especially during the early years of their service. That the work is by no means perfect is not wholly the fault of the Company; to show that much remains to be done on the part of the girls themselves is my object in this article.

I am ignorant of provincial arrangements, but I presume the general idea is much the same, viz., that the Company provide the kitchen staff and bear the other expenses in connection with the cooking, the operators themselves paying for the actual food.

I believe I am right in thinking that the co-operative lunches were first provided in Liverpool, and that originally the girls provided their own crockery and utensils. When I speak of the catering committees in London having been but recently formed, it is, of course, understood that actual dining arrangements have been in existence for many years now.

These committees are only carrying out the original intention of the Company with regard to the provision of meals, a fact which has perhaps been lost sight of by the present day operators. That the catering had been allowed to get more or less into the hands of one person was the fault, probably, of an inclination to shift work on to someone else's shoulders, and the details in connection with it should never have been allowed to become part of the duties of the clerk-in-charge, whose time naturally could be more profitably employed. Further, in making the original concession in the shape of meals, the comfort of the operators was the principal aim, and in now making the food question in London a matter to be governed by the operators themselves, it is again the aim of the powers that be to add to their comfort. Is the great effort made, with the great expense to which the authorities have gone towards this end, recognised at its proper value?

It may be news to the Metropolitan and Provincial staff alike, that the wages paid to the cooking staff in London represent no less than £1,300 per annum. The upkeep of crockery, cutlery, utensils, &c., added to this, must represent a respectable figure, and we must remember that, although better conditions of work means better work, and a contented staff is the best staff to have, it is through the Company's aid that the operating staff are able to obtain a two-course hot lunch for an average of 5*d*. a day, and afternoon tea at 1*d*.

"Lyons," the "Aerated Bread Co.," and the like, are boons to London workers, but from their bills of fare it is obvious that if one is to keep within our own figures there would not be a substantial meal obtainable, and, if one sticks to the more inexpensive dishes, there would be a great sameness about one's food. Should one, on the other hand, launch forth into the extravagance of the ordinary restaurant lunch, I think, at the lowest computation, from 1*s*. 2*d*. to 1*s*. 6*d* would be the probable charge per day for the meal which costs us 5*d*. at the exchanges.

In the Post Office, I understand, their catering arrangements are as follows: In the dining-rooms separate tables, each for about six persons, are provided, and they have a larger staff of waitresses than is usual in the Company's dining-rooms—a matter which, I think, we can improve on, as I believe it would go far to promote greater order where we have so large a staff to dine.

There is a choice, apparently, of soups at 2*d*.; beef-tea, 6*d*.; two kinds of fish at 4*d*., as well as fish-cakes; two hot joints at 4*d*., or fowl or rabbit at 5*d*.; cold meat, ham, or tongue, 4*d*.; vegetables, 1*d*. each; two sweets and two kinds of milk puddings and stewed fruit daily, at 2*d*. per portion; and many sundries.

Now this looks very promising at first sight, but a little calculation will show the lunches alone would cost to the operator an average of 4*s*. or 4*s*. 6*d*. per week. This money is not paid into a tea fund, and any profits which accrue are not divided among the operators or clerks. I am sure, however, the wide choice of dishes will appeal to many, and on this account there may be optimistic anticipations of 1911, but perhaps by that time the Company's committees will have brought our own system to such a pitch of perfection that the Department will allow us to continue on our own lines. At any rate, for the purposes of this article, we must confine ourselves to our own work.

Principally do I wish to bring before the clerks-in-charge and catering committees of the different exchanges in London what an apparent want of uniformity exists in the management of the funds; what an absence of originality in the *menus*; and how some committees excel in comparison with others.

As the Company accept no liability with regard to the expenditure of the money, the Examining Matron is placed in the somewhat anomalous position of having no voice in the matter, and yet being indirectly responsible if complaints arise. In some exchanges the operators are like the rich man, "faring sumptuously every day," and making a big profit into the bargain; while in others it is difficult to make both ends meet on very ordinary meals. This is a matter on which I feel strongly. There is certainly some ground for the comparisons drawn by the operators between different exchanges; the committees are doing good work, but there is more to be done.

The charge for the week's meals ranges between 2*s*. 5*d*. and 2*s*. 7*d*., including teas. Now, on the basis that the more there are to provide for the cheaper is the cost per head, at a large exchange either this figure should be reduced, or the fare provided be of better or more varied character. Yet it is my experience that the smaller the exchange the better the meal, and, in at least two cases, the larger the balance to be divided among the operators at the end of the year.

Again, in the larger exchanges the less varied *menu* is provided. The explanation of this might be the greater work entailed on the cook in providing for the larger staff, but I cannot entirely accept this as a sufficient reason.

The kitchen staff is provided according to the needs of the exchange, and, with one exception, which is now under consideration, is ample for the work, and if your cook will not rise to the occasion will not arrange her staff and her work so as to bring about the best results—she must be educated up to it.

I know that cooks will place obstacles in the way; to a reasonable extent these can be surmounted. It is marvellous what can be done in emulating Bruce's spider.

The apparently easiest dish in the world, and the one which in the cook's eyes fills all gaps in the *menu*, is boiled custard. Oh! that boiled custard, with its accompaniment of three stewed prunes, or dried apricots, or, at best, stewed fruit! If the amount consumed by telephone operators annually could be put together, there would be nothing less than a small Atlantic ocean. Is its frequency due to economic reasons? Is it considered a substitute for raw egg and milk, for producing that soft voice, which is "an excellent thing in woman?" Or is it really a favourite? Cannot we, at any rate, reduce it? Cannot those of you who are looking forward to one day forming a catering committee of one in a very important little household, experiment with your suggestions beforehand?

Remember, the cook is there to do the cooking, and after the meals are over, except in small exchanges, she should not necessarily be spending her time assisting the maids, and could therefore often be preparing for the next day.

In one exchange on "fried-fish day," this is sent in ready cooked from a restaurant. What is the cook doing on that day, and are the operators profiting from her leisure by a more elaborate meal the next?

If there is one better way than another of making or cooking a dish, why not have the better way? You may find your cook conservative in this respect; you probably will, but she, like yourselves, must be "progressive."

Then, to revert to the bill of fare. If one does have a brilliant idea and the result is successful, as often as not it becomes a staple dish, and you have it, like the poor, always with you.

Do not think, in thus bringing before you these matters, I write in any fault-finding mood. It is not quite practicable perhaps to meet you personally in a body, and I am therefore but taking the opportunity of meeting you individually in print. No one recognises more than myself the real difficulties that obstruct your path in endeavouring to please everybody; it would be a wonderful body, indeed, that succeeded in accomplishing that. In the little time since these committees have been formed I consider a marked improvement has taken place, especially in some cases. You must forgive me if I say I am still not content, and I do not want you to feel satisfied that you have done all you can for yourselves and your fellow-workers in the position to which you have been elected.

In dealing exclusively with the Metropolitan exchanges, I offer no apology to our provincial colleagues. If I have told them a little of what we are doing here, I hope in return one or more of them will write articles giving us valuable information. In Glasgow, I understand, the average charge for dinner per day is 3½*d*. Will not our Scotch cousins let us into their secret; not that I would suggest our boiled custard should retire in favour of porridge.

In conclusion I would say that most of all do I wish that such a spirit of emulation would arise that the judgment of a Solomon would be needed to decide the best *menu*, the wisest finance, and the finest order maintained in the tearooms; the latter not as a matter of discipline, or simply because the Traffic Manager has issued rules, but from the girls' own finer sense of what is fitting and worthy of each individual operator at that exchange.

SNOWSTORM IN THE POTTERIES.

A very severe snowstorm occurred in the Potteries district on Tuesday, February 27, and for a time the position was very critical. Fortunately, however, the snow turned to rain and, consequently, serious damage did not result. As it was, there were over 230 wires broken down and a few poles drew their stays. In one or two cases cables were broken down. Taken as a whole the weather in the Potteries district has been very favourable during the past winter, considering the usual severity experienced in this part.

TRUNK TICKETS: A SUGGESTION FROM DUNDEE.

Considerable time is taken up in getting out the information to enable replies to be made to enquiries from subscribers regarding their trunk accounts. This has just been reduced to a minimum in the Dundee District Office by the erection of a pigeon-hole cabinet over the enquiry telephone. A hole, measuring 3½ inches by 3½ inches, is provided for each day of the month and so marked. Into these holes the trunk tickets are placed in the order of date (which is the order the tickets are received back from the Post Office) at the end of the month. When enquiry is made regarding any particular call, the date being given from the account by the enquirer, the corresponding day's tickets are taken from the pigeon-hole and the particular ticket readily picked out.

MICHAEL FARADAY: A MEMORIAL TO THE GREAT SCIENTIST IN A NATIONAL TELEPHONE EXCHANGE.

A circumstance of peculiar interest to telephone men in connection with the memory of Michael Faraday has recently come to light. The building occupied now by the National Telephone Company as an exchange at Bride Street, Barnsbury, in North London, and known as "North" Exchange, was formerly a meeting-house of the Sandemanians. The premises were purchased from the trustees of that body as recently as 1899. The Sandemanians prior to 1862 met in Paul's Alley, Barbican. From 1862 to 1898 they assembled at the Barnsbury Grove Meeting-house, now North Exchange. Michael Faraday was an elder of the church and regularly attended service at the Barnsbury Grove Meeting-house from the date it was built, 1862, to 1867, when he died. Mr. Blaikley, an elder of the church which formerly met at Barnsbury, and who has knowledge of the facts, has pointed out the exact place where Faraday sat. This memorable spot coincides with the platform at present occupied by the chief operator.

Associations of this nature ought not to be passed over without some permanent memorial, and it is hoped that a tablet may be erected, marking an historical association of such great interest to all members of the electrical professions.

THE SUSPICIOUS FARMER.

Shortly after the opening of the Dundee-Forfar Trunk Line, over 24 years ago, an old farmer was invited to try the telephone, then a novelty of course, by speaking over the wire. The distinctness of the voice from the distant end seemed to surprise the farmer, who, being asked if he heard quite well, replied: "Hear 'im? I heard 'im as well as I am hearing you. But ——" (with a shake of the head he pointed to the wall on which the instrument was fixed, and muttered as he left the room) "I wid like to see wha's ahent that wa'."

WHAT THE COMPANY IS DOING.

The Company has opened 21 new exchanges since the beginning of the year, bringing the total number up to 1,216. The new exchanges are at Rochford (Ipswich district), Keynsham (Bristol), Sheerness (West Kent), Mildenhall (East Coast), Kidwelly (Swansea), Thorner (Mid Yorks), Bishopbriggs (Glasgow), Small Heath (Birmingham), Ellesmere Port (Birkenhead), Elstree (Herts and Beds), Shifnal (North Midland), Eaton, near Norwich (East Coast), Soham (East Coast), Stennalees (Plymouth), Newburgh (Dundee), Wye (East Coast), Abernethy (Dundee), Westbury, Wilts (Bristol), Broadstone (Hants and Dorset), Brislington (Bristol), Long Preston (West Yorks), and Carnforth (Preston).

Birmingham. A site has been acquired for building new premises at Hill Street, Birmingham, and plans are being got out for the construction of a new exchange thereon, which will, of course, be common battery system, with the most up-to-date improvements, and to accommodate 10,000 subscribers. It will serve the whole of the district south of the railway.

Central Exchange is being enlarged and central battery equipment for 2,080 lines has been ordered. Extensive alterations are being made in the building. The growth of Birmingham has necessitated sub-exchanges at Aston, Selly Oak, Edgbaston, Handsworth, and Moseley.

Edinburgh.—*Central.*—This exchange is being converted to standard central battery equipment and is approaching completion.

Leith has already a central battery plant for 1,000 lines.

Glasgow.—*Hillhead, Argyle, and Charing Cross Exchanges* are to be extended with central battery equipment.

Langside, Ibrox, and Pollockshiels Exchanges are being extended.

Hull.—*Central.* The central battery switchboard is being extended by an addition for 2,160 lines, and alterations have been made in the building, largely increasing the size of the switchroom.

Scarborough. New central battery equipment for 600 lines has been ordered.

Newcastle.—*Jesmond.* Central battery equipment for 700 lines has been ordered and will be erected in a specially-designed building.

Derby.—The installation of a new central battery equipment for 900 lines has been begun in a specially-designed building.

Brighton.—This exchange is being converted to standard central battery.

Hove.—New central battery equipment for 900 lines has been brought into use.

Swansea.—The switchboard is being extended to accommodate 700 additional lines.

Londonderry. Central battery equipment for 450 lines has been ordered; underground construction is completed.

London.—*Paddington.*—A specially-designed building is now in course of erection and is approaching completion. Central battery equipment for 5,500 lines is being constructed.

Gerrard.—A specially-designed building is now in course of construction to accommodate a switchboard for 9,520 lines.

Brixton.—Central battery equipment for 1,500 lines is now in course of erection.

Hop.—New central battery equipment for 3,600 lines is now in use.

Eastern.—The specially-designed building is being extended and central battery equipment for 2,900 lines is now approaching completion.

Central Battery Private Branch Exchanges.—The following hotel systems have been executed or are in hand:

Queen Anne's Mansions	...	460	stations.
Hyde Park Hotel	... ...	300	,,
Coburg Hotel	... ...	160	,,
De Keyser's Hotel	... ...	160	,,
Charing Cross Hotel	... ...	280	,,

The lines at the following places are being put underground:—*Paisley, West Hartlepool, Oldham, Altrincham, and Withington.*

Tunbridge Wells.—A large extension of underground plant has been approved.

OPERATORS' THRIFT CLUB AT CARDIFF.

MR. H. J. MARSH, Exchange Manager at Cardiff, contributes the following account of the Operators' Thrift Club, which will be of general interest to the traffic staff. The club has been in existence a little over two years, and successfully fills its mission. If it is desired to start a similar club in any other centre, Mr. MARSH will be happy to supply a copy of the rules and any further information required.

In September, 1903, the Exchange Manager (after receiving the sanction of the District Manager) placed before the operating staff a scheme for starting a thrift club, and, the operators giving unanimous support, a club was organised on October 2, 1903.

The club is managed by a committee consisting of the Clerk-in-Charge and five operators, one of whom acts as secretary. The committee is elected at the general meeting each year, and holds its meetings quarterly. The object of the club is to encourage thrift among its members. The membership is confined exclusively to the day operating staff; the minimum rate of deposit has been fixed by resolution at 6*d.* per week.

The club has been a great success; the first year the average contribution per member amounted to £2 12*s.* 9*d.*, the second year the average rose to £2 17*s.* 7*d.*

As will be seen by the detailed statement, the sum of £81 14*s.* 6*d* was paid into the club in one year; the withdrawals amounted to £64 10*s.*, leaving a balance to the second year of £17 4*s.* 6*d.* The second year there was a gratifying increase in the contributions, which amounted to £100 9*s.* 6*d.*; the withdrawals were £92 15*s.*, leaving a balance of £23 18*s.* 6*d.* to carry forward to the current year.

The interest allowed by the bank in which the club funds are deposited is 2½ per cent. per annum, but, as the average balance is small, the interest earned is not a serious amount; it has been decided to dispose of this as desired by the members at the general meeting held each year, and the interest for last year was sent to the Cardiff Infirmary.

A club of this kind encourages thrift among the operators, and enables them to save, by easy instalments, a sum of money which is of considerable help to them when taking their annual holiday. With the money saved in this way an operator can take a real change, which is generally beneficial to health and spirits.

It is very gratifying to the members of the club, as well as to the originator, to be able to state that the results aimed at have to a large extent been achieved.

	DEPOSITS.	£	s.	d.
Dec. 31/03	Deposits for quarter ..	19	12	0
Mar. 31/04	Ditto ..	23	11	0
June 30/04	Ditto ..	19	19	6
Sept. 30/04	Ditto ..	18	12	0
		£81	14	6
Oct. 1/04	Balance forward	17	4	6
Dec. 31/04	Deposits for quarter ..	26	15	6
Mar. 31/05	Ditto ..	26	11	6
June 30/05	Ditto ..	24	1	0
Sept. 30/05	Ditto ..	23	3	6
		£117	16	0

	WITHDRAWALS.	£	s.	d.
Dec. 31/03	Withdrawals for quarter	2	6	6
Mar. 31/04	Ditto ..	3	6	6
June 30/04	Ditto ..	18	10	0
Sept. 30/04	Ditto ..	40	7	0
	Balance forward	17	4	6
		£81	14	6
Dec. 31/04	Withdrawals for quarter	19	18	6
Mar. 31/05	Ditto ..	12	14	0
June 30/05	Ditto ..	22	9	0
Sept. 30/05	Ditto ..	38	16	0
	Balance forward	23	18	6
		£117	16	0

Oct. 1/05 Balance forward £23 18 6

The Secretary of the Cardiff Operators' Thrift Club will be pleased to give any member of the Company's staff any further particulars desired.

THE VALUE OF AN EXTENSION STATION.

IN the *Evening Bulletin* of February 14 there is an instance of the saving of the life of Mr. Arthur Emlen Newbold, 2,200 Spruce Street, by a Bell telephone extension station located at his bedside. On Saturday (10th), in the early morning, while in bed he was seized with cramps, caused by acute ptomaine poisoning. The other members of his family were away and he had not strength to awaken his servants, for he had no No. 2 P.B.X. He called a physician, and the prompt arrival of aid saved his life. Philadelphia *Telephone News.*

THE NEW STOCK LIST AND THE NEW SALES CATALOGUE.

BY P. CHESTER.

THE Stores Department hopes to issue in the course of the next few weeks two important books—a new Stock List and a new edition of the Illustrated Sales Catalogue.

The rapid growth of the Company's business has rendered the method and principle on which former stock lists have been framed obsolete and unsuited to present requirements. The Company's work is carried on at high pressure.

This has to be legislated for, and I think the new list (an advance proof of which I have had the advantage of seeing) will be found to meet every possible requirement of not only the busy man, but of every one, learned or simple, who has cause to make use of it.

The anomalies that undoubtedly exist in the present list, created mainly by the extraordinarily rapid growth of the Company's business, will be found to be entirely swept away, and in their stead there will be found to reign the utmost simplicity.

In the first place—and this is the outstanding feature—every article will appear on a loose sheet, and these loose sheets will be placed in strict alphabetical order in a substantial cover. By employing loose sheets it will be possible to add, withdraw, or replace, without interfering in any way with the book as a whole, thus doing away entirely with addenda slips; this alone will be found to be a great boon.

As regards the method on which the book will be worked, to take a concrete example, you want to know all about what sort of hammers the Company uses. You turn to the page headed "Hammers," and you will find that the Company make use of eleven different kinds of hammers, numbered from one to eleven, and against each number is a full description of the hammer. This may not be the happiest of examples, but a moment's reflection will show that this principle, applied to every stock list article, will make the list of enormous use, especially in the case of the more complicated articles.

There is a feeling—it may be a wrong one—that even the best-conducted districts occasionally have a shot at some article in the Stock List which they *hope*, on arrival, will prove to be what they want. Very often it is not, and after a decent interval the article appears on the transfer list. No such wasteful process should occur with the new list. Then again, the requisitioning for articles will be simplified, inasmuch as it will only be necessary to state the name of the article and the number in the list; for example, a requisition for, say, "1 H.G. receiver, compound, with metal band," will be condensed to "1 receiver 4," a sensible reduction in writing, which will, no doubt, be fully appreciated.

A few words about the Sales Catalogue.

There are some radical alterations here, but a very few lines will suffice to describe them

It has been wisely decided to issue this in eight or nine sections, each section having a different coloured cover, and it is expected that this sectional arrangement will prove of very great utility to those energetic officers who are charged with the duty of extending the Company's sales business. A certain number of covers will be issued for binding all the sections together, to provide for those instances where a complete catalogue is required. Each section will bear a special letter, and the articles described in it will be numbered from one up. The size will be crown quarto, and I feel sure that this will be found much more handy than demy quarto, the present size.

Just one word, *re* meta—— the sub-editor says he can positively allow me no more room, so . . . .

Since writing the above I have been telling the sub-editor what an able man he is, and he tells me he can allow me just three more lines, so I will only add that very early in April a new metaphone catalogue will be issued; the only alteration of importance here will be found to be the size, which is to be crown quarto.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

Published Monthly at

TELEPHONE HOUSE, VICTORIA EMBANKMENT, LONDON, E.C.

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THE GENERAL MANAGER'S MESSAGE.

THE NATIONAL TELEPHONE JOURNAL, established for the benefit of a staff of nearly 16,000 workers scattered over all parts of the British Islands, needs no apology for its existence and need make no anxious plea for support. But a few words of salutation to the many readers who eagerly await the issue of the first number cannot be omitted.

We telephone workers are engaged in an industry so fascinating and so many-sided, that the interest even of those least gifted with imagination is awakened. No man in the telephone world, however humble his present position may be, should forget for one moment that he is aiding in providing society with what is beyond compare the most rapid and effective means of communication yet devised. Telephone service is to all other means of communication as the swallow's flight to the crawl of the snail. We make the magic carpet of the Arabian Nights a twentieth-century reality by our great organisation of wires, switchboards, and telephones. By annihilating distance, by the almost magic feat of transmitting the human voice over any distance, putting brain in instantaneous touch with brain, no matter what obstacles may intervene, we create new industries, we quicken and cheapen every industry, we create wealth, we save wealth from destruction, and often we rescue human life. None can ponder over what the telephone service does, through its unapproachable speed and directness of communication, without feeling his interest quicken and his pride swell at being connected with an industry of such incalculable value to mankind.

It is to broaden that interest that the NATIONAL TELEPHONE JOURNAL should direct its efforts. The ordinary user of the telephone service recks little of the great organisation—human and mechanical—that lies behind the telephone on his wall. But we know. We know that to design and construct this great system needs engineering—and engineering of a very high order—that to maintain it in efficiency, to search for faults and to prevent them, needs a body of highly-trained electro-mechanical Sherlock Holmes's, that to operate it with the lightning rapidity which the public demand needs a feminine army, recruited, trained, instructed, and organised as scientifically as any army that takes the field. We know, too, that these main branches of our work are laced to the great stem of administration by many other branches. To feed the system we need our stores and factories; to know what we are doing and what results we are producing—and the test of any industry worth the name is successful finance—we need our statistical, financial, and clerical forces; to carry our wires over the land we need our diplomatic wayleave officers; to educate the public and carry on the telephone propaganda we need our staff of missionaries who spread the telephonic faith far and wide; and to keep ourselves and those with whom we have dealings within the four corners of the law of the land we need those versed in that law.

It should be the aim of the NATIONAL TELEPHONE JOURNAL to interest the workers in every branch of our organisation, and to arouse the interest of each branch in every other branch. The telephone service has its business as well as its scientific aspects. Indeed, although it is founded on one of the greatest inventions of science, and has called forth many other inventions, and although scientific research is the lifeblood of the industry, it is no exaggeration to say that the business problems of modern telephone service are as complex as the technical problems. Further, there are necessarily, in the conduct and administration of such a vast industry dealing with such a mass of detail work, innumerable questions of business method and organisation. On all of these topics, from the most abstruse point in the science of telephony to the most commonplace detail of office management, the JOURNAL should publish much which will be of direct and lively interest to the army of National telephone workers. On all of them it should welcome ideas, suggestions, comments, and inquiries.

Finally, among such a large staff the note of personal interest vibrates; many members have friendships and in all there is the comradeship arising from a common cause. This comradeship should be encouraged throughout all ranks. All branches, all departments throughout the country should feel that they are working as one team with a single object—to give the British public an efficient telephone service, and to give the shareholder a fair return on the capital he has sunk in what was at the the beginning a purely experimental enterprise. To maintain the personal interest, to promote the feeling of comradeship, to foster the spirit of team work on the broadest scale, the JOURNAL should publish news of the staff from all centres, news of appointments, transfers and promotions, and news of staff gatherings—scientific or social.

The first number may have imperfections and shortcomings, but with experience in the journalistic field there should be steady improvement. With these few words I commend the NATIONAL TELEPHONE JOURNAL to my fellow-workers. Long may it flourish to serve a useful purpose and to help and encourage every one of us.

WM. E. L. GAINE.

TELEPHONE ENGINEERING.

We begin in this issue the publication of an admirable paper by Mr. J. J. Carty, the Chief Engineer of the New York and New York and New Jersey Telephone Companies, on "Telephone Engineering." Mr. Carty is one of the highest authorities on the subject, and his paper should be carefully studied by all interested in telephone work. The paper brings out very clearly not only the complexity of telephone engineering, but the great bearing both on the finances of a telephone company and on the efficiency of the service of the correct solution of telephone engineering problems. Another point which Mr. Carty emphasises, and it is one which is too often lost sight of in the telephone world and outside it, is the close relation between telephone business methods and telephone engineering. It is not too much to say that in telephone work incorrect business methods lead to unsound engineering, and conversely, if the engineering is defective, ingenious business expedients will not suffice to set matters straight. Mr. Carty's illustrations are necessarily drawn from American conditions, which differ considerably from those of this country. The toll business, for example, which is referred to at length, practically does not exist here. In America the toll business, or suburban traffic conducted at message rates, is a very important branch of the business of every local telephone company. In this country this traffic is all Post Office trunk traffic, it is conducted at extremely low rates, it yields no return to the Company and probably none to the Post Office. With such an important branch of profitable endeavour removed from the telephone company's field, a wide difference in conditions arises, and this necessarily has its effect on the point of view from which telephone engineering problems must be studied.

Not the least valuable part of Mr. Carty's paper is his condemnation of what are erroneously called "common-sense" methods. To proceed with work, to construct buildings, conduits, cables and other plant without beforehand thoroughly studying the factors and solving the problems, is not to avoid solving these problems, but amounts merely to giving an answer without consideration. By the very fact of doing the work an answer is given, but subsequent results may prove, and probably will prove, the answer to have been entirely wrong and much money to have been wasted. The motto which underlies the whole of Mr. Carty's paper is—"*Study your Problems*"—and it is a motto which every telephone man should take to heart.

Mr. Carty's paper will do much good to telephone workers. If they could be induced to read it and if they could understand it, it would do still more good to certain Members of Parliament and newspaper scribes who settle telephone problems out of hand, with as complete disregard for telephone engineering and telephone finance as if those subjects were as far removed from practical politics as the canals of Mars.

QUICK COMPLETION OF NEW LINES.

The importance of quick work in completing new orders is touched on in Mr. Anderson's paper on "Office Organisation." Prompt installation of the service of a new subscriber is highly desirable from all points of view—from the new subscriber's point of view because directly he has actually signed the contract he feels that he wants the service very badly, from the Company's point of view because the revenue begins when the service begins, and from the general public point of view because each telephone connected adds to the value of the service to the public.

There are various factors in the work, and unless all of these are favourable it is not practicable to obtain uniform quickness in connecting up new orders. An efficiency curve, drawn on the same principle as the traffic curve for answering efficiency, would show as a desirable standard 80 per cent. of all new orders completed within seven days, 90 per cent. within fourteen days, and only 10 per cent. delayed over fourteen days. To attain such a standard as this requires several important conditions; there must be ample spare capacity, both in the exchange plant and in the line plant—but especially in the distributing plant; there must be freedom from frequent and serious wayleave troubles; there must be efficient organisation of office, engineering, and exchange staffs, and efficient general organisation—good team work all round.

The wayleave trouble is always with us. It is one of the greatest troubles of the telephone business in this country, where the privileges of property owner and tenant are great, and are too often exercised in an unreasonable and obstructive spirit. Even that trouble we can reduce by education and diplomacy, by educating the public in the importance of the telephone service, and the difficulty of carrying it on without wires. The other branches of the work we have under our own control, and it behoves us to see that the different parts of the machine work smoothly together and all drive in the same direction. What can be done has been shown by Brighton, where there is no lack of difficulties, normal and otherwise. The average time of connecting up a new subscriber at Brighton has been reduced to seven and a half days. In January 58 per cent. of the new orders were completed under five days, 68 per cent. under seven days, 81 per cent. under ten days, 89 per cent. under 14 days, leaving only 11 per cent. which took over fourteen days. What have other districts to say on this important point?

COUNTRY HOUSE FIRES AND THE TELEPHONE SERVICE.

Every winter several valuable country houses are completely destroyed by fire. In many cases the loss is far greater than the mere money value of the property destroyed, as often the mansion sacrificed to the flames is one of those noble architectural relics of the past which are practically national possessions, and often it contains art collections which are priceless and irreplaceable. Such a loss is not merely a personal loss to the owners, it leaves the nation poorer. Sometimes, too, human life gives its toll at these fierce and isolated fires.

The story of the country mansion fire is almost invariably the same. The fire is usually discovered at night, the family and servants are hastily aroused, a man is despatched on horseback for the nearest volunteer fire brigade, and all hands do their best with the scanty means available to extinguish the fire and to save movable property. The end of the story is almost invariably the same, too—house and contents are reduced to a mass of ruins, the few portable objects saved only serving to accentuate the ruin.

That an isolated country mansion, generally worth, with its contents, many tens of thousands of pounds, and often, as we have said, of practically priceless value, should be left without connection to the general telephone service of the country, is one of those things which passes understanding. The ordinary daily use of the telephone service in such a situation is valuable enough, but in such an emergency as fire the value of telephone communication is not to be reckoned in money. At the first alarm, all of the neighbouring fire brigades could be advised in less time than it would take the horse alarm-bearer to get fairly started. With telephone service available there is no doubt that many country house fires would be got under control—without it, they too will often continue to result in complete destruction. Yet so conservative are most owners of large country houses, that probably not until the fire insurance companies make telephone service a compulsory condition of insurance will they be brought to realise what a valuable safeguard the service is.

Point is lent to these remarks by two recent instances of country house fires where telephone service was available, with the result that aid was promptly obtained and the fire overcome before it had reached serious proportions. One of these was at Dunston Hall, the Norfolk residence of Mr. GEOFFREY BUXTON. Dunston Hall is connected with the Norwich Exchange, and as soon as the fire was discovered the Norwich City Fire Brigade was called by telephone and left immediately, with the result that the major part of the house was saved. The other was at Chippenham Park, near Newmarket. Here a fire broke out in the gardener's house. Telephone connection had recently been established with the new National Exchange at Fordham, and the volunteer fire brigade there was called, responded promptly, and soon got the fire under control. In each case the damage would have been far more extensive had the telephone service not been available.

Telephone men do not need these object lessons to convince them of the value of telephone service in all emergencies. But such incidents, when compared with the various cases of complete destruction of fine country mansions which have occurred during the past winter, ought to show the public, and owners of big houses in particular, that telephone service is a very cheap and effective form of insurance.

HULL MUNICIPAL TELEPHONE SYSTEM.

AT a recent meeting of the Hull City Council a debate occurred on the proposed agreement between the Hull Corporation and the National Telephone Company for the transfer to the Company of the Hull municipal telephone system. The Telephone Committee had prepared an agreement and recommended its adoption by the Council, but the result of the debate, which turned chiefly on the political side of the telephone question, was that the matter was referred back to the committee for further consideration.

FIRE DRILL.

FROM Leicester it is reported that the fire drill proceeds about as follows:—In three seconds after the fire-bell rings current is switched off all circuits. In ten seconds all officers are in their appointed places with pumps and blankets. In twenty seconds the last operator has left the room and the Chief Operator is ready to follow. In 30 seconds the Local Manager is ready with sand-buckets to smother any conflagration. Leicester considers this a record. What have other districts to say?

TO CONTRIBUTORS AND CORRESPONDENTS.

To the many who have sent in articles, notes, and news we extend our sincere thanks. It has been necessary, in order to keep the size of the JOURNAL within reasonable limits, to hold over numerous contributions, and some, because of duplication of subject and for other reasons, are not available for publication.

All contributors are earnestly requested to send in their manuscripts in such condition that, if acceptable, they can go immediately to the printers. Typewriting is always preferable to handwriting and in any case only one side of the page should be written on, and a good margin preserved. Abbreviations of words should be avoided, though brevity in expression is desirable. Staff correspondents are particularly requested to make their notes as clear and brief as possible, and always to begin personal paragraphs with the name of the person referred to, and to begin notes regarding new work with the name of the place. Careful attention to these suggestions will save the Editing Committee much unnecessary work.

ANNUAL MEETING OF OFFICERS.

A DEPARTURE is being made this year in the procedure to be adopted regarding the discussion of papers at the officers' meeting. Hitherto it has been the custom to ask for papers from members of the staff on any subject on which they might think fit to write. While this practice has been fruitful of good results, it has had a tendency to produce unwieldiness in the mass of material for discussion. Many interesting papers have in recent years been crowded out of the programme. It is proposed for the current year to ask certain members of the staff, who are specially qualified, to contribute papers on specific subjects. These papers will be sent to Head Office in triplicate, and as each is received it will be handed to two other members of the staff to criticise; the original papers, together with the criticisms, will be printed and circulated in good time to prepare for general discussion at the meeting, which is fixed for May 18.

The following are the papers to be discussed:—

"RECORDING OF CALLS." By Mr. W. A. VALENTINE, of Glasgow. The officers deputed to criticise are Mr. F. W. TAYLOR, Brighton, and Mr. J. EDMONDS, London.

"HOW A CONTRACT OFFICE MAY HELP THE SERVICE." By Mr. L. H. LOWE. This will be criticised by Mr. C. C. WORTE, of Hull, and Mr. W. S. TAYLOR, Contract Agent, Glasgow.

"EXCHANGE ORGANISATION: HOW IT MAY BE IMPROVED." By Mr. WILLIAMSON, of Nottingham. Mr. H. CORNER, London, and Mr. W. NAPIER, Head Office, have the task of criticising this paper.

"OPEN WIRES AND COVERED WIRES FOR DISTRIBUTION." By Mr. W. SCOTT, Manchester. The officers deputed to criticise are Mr. C. E. GILLETT, Leeds, and Mr. A. WATTS, Head Office.

Members of the staff invited to attend may look forward to an exceptionally interesting discussion. The scope of the papers is fairly wide, and the officers deputed to deal with them well qualified.

LIFE INSURANCE FOR THE STAFF.

UNDER the very advantageous arrangements made by the National Telephone Company with the Provident Clerks and General Mutual Life Assurance Association, members of the staff can effect any form of life assurance for £50 and upwards on most favourable terms, one-twelfth of the annual premium being collected by the Company from the salary or wages of the assured once a month.

When the scheme was adopted some seven years ago, the Secretary of the National Telephone Company was appointed agent of the association, and the commission payable to agents in the ordinary way is distributed to the assured at the end of each year; this amounts to a considerable rebate and makes the insurance very cheap.

A revised pamphlet, containing rates and proposal forms, will shortly be sent to District and Local Managers for circulation among the staff. In the meantime, particulars can be obtained at any of the Company's Offices, or Mr. Anns will be pleased to answer any question addressed to him at Telephone House, Victoria Embankment, London, E.C. An announcement regarding this matter will be found on the back cover of the JOURNAL.

CORRESPONDENCE.

NATIONAL TELEPHONE COMPANY'S TELEPHONY CLASSES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I DO not bring this matter forward merely in order to criticise those who are doubtless far better educated and more experienced in electrical matters generally and telephony in particular than myself; but as one who has had experience of the "A," "B," and "C" classes, I am convinced that the classes are not so beneficial to the staff as it is intended they should be, and I endeavour below to give my reasons for that conviction. Also, I suggest some alterations, in the hope that such suggestions will receive consideration, and that, through the medium of the JOURNAL they may meet the eyes of fellow-members of the staff who are better able to express their views on the great work of technical instruction than I am.

In the first place: Are the classes popular among the various branches of the staff, especially among those now in junior positions who hope to figure on the senior staff as responsible officers in the future?

I am, of course, unable to speak beyond my own district, but here I know they fall far short of proper appreciation among those whom they should enable more thoroughly to understand the various branches of the work on which they are daily engaged.

The main reason of this lack of popularity is, I think, the fact that the classes are far too mathematical for the majority of the staff. This carries the classes over the heads of many who might otherwise profit by them.

Secondly, in many cases the instruction is far from comprehensible to men who are for the first time, perhaps, reading some particular matter, and possibly many who are not strongly imbued with patience turn from their books in disgust, not remembering the maxim to try, try, try again.

A third reason I might give, and in this I hope I may not be misunderstood and give the impression that I am anxious to pose as a critic of the work of men more clever than my humble self—and that is, that there has always appeared to me to be a lack of that spirit of trust and confidence which is indispensable between instructor and instructed if good results are to be obtained.

Up to now, I am afraid, my criticism has only been destructive, so, with all respect, I would submit a few suggestions which I feel would go a long way towards interesting the staff generally in learning all they can of the subject of telephony, and so fitting them for holding more advanced and responsible positions.

All technical instruction should be controlled by a Special Department at Head Office, under a Director, who, of course, must be a thorough electrician; but, to ensure that everything shall be couched in language comprehensible to those members of the staff who are not so highly educated, an Assistant Director should be appointed, who, while fairly educated, would not rank in the first class, but in knowledge would be more in sympathy with the majority of the students. It would be the duty of the Assistant Director to examine all instruction papers and simplify any point where a student might find difficulty in fully grasping the instruction given.

A general electrical class could be run for the benefit of those who might wish for a general electrical education, but otherwise I think it would be better to divide the classes more in accordance with the familiar divisions of the work as:—Overhead Construction, Underground Construction, General Telephone Instrument Work, Exchange Equipment, &c.

Of course, a student could take up more than one class if he wished. The questions should not be mathematical except where absolutely necessary, but should aim at making the student write down answers to questions such as he would give if subjected to an oral examination.

The fees should, of course, be kept as low as possible.

Another, and last suggestion I should like to see adopted, and that is that all communications between instructors and students should be private, and enclosed in special envelopes, of course under cover of the Company's general correspondence. Many, among them myself, would have no objection to anyone seeing their papers, but I am sure it would tend to stimulate the feeling of trust and confidence before mentioned, if every student knew himself to be in personal touch with those who were teaching him.

I have thought it my duty to set down, somewhat crudely I fear, my views on this matter, and earnestly hope that those in authority will give them at any rate some consideration, and that those members of the staff who think the present classes in need of some alteration will communicate their views to the columns of the JOURNAL. W. ALEX. WILLIAMS.

SUGGESTIONS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MAY I suggest, if the idea has not already been provided for, that a Sale and Exchange Column be opened in connection with the JOURNAL. Amongst such a large staff this would be very useful and form an interesting link in bringing the staff together.

Of course, no responsibility would rest with the JOURNAL for any of the transactions carried on through it, but the fact that the subscribers to the JOURNAL would all be members of the Company's staff would be sufficient protection against fraud, &c.

If you approve of the idea and any help is required in connection with working same, I should be very pleased to volunteer.—I am, &c.,

5, Telephone House, March 13, 1906. A. WARD.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

A MEMBER of the Contract Office staff has suggested that a Holiday Apartment Reference Bureau might be introduced with advantage to members of the Company's staff. I would suggest that only apartments which can be *personally* recommended should be included.

It is possible, of course, that the introduction of such a column might interfere with the Advertisement Department of the JOURNAL, and would, in consequence, not be desirable. W. L. RAE.

March 9, 1906.

HOW NOT TO DEAL WITH ENQUIRIES.

AN employee (A) in one department telephoned an employee (X) in another department, and an assistant answered X's telephone call. A stated his business and found that he had been talking with the office boy. He didn't understand what was wanted, but said, in a very loud voice, that he would get someone who did. While A was holding his receiver closely to his ear, the office boy banged X's receiver down on the desk and went away. A clerk (a girl this time) came to the telephone and A repeated his question. The girl said that she would get Mr. X. She put down the receiver carefully and went to find Mr. X. A man with a deep voice next came, and the story was told for the third time in detail—for A thought he had X this time. The deep-voiced man stated, in sad tones, that he was sorry but he had never heard of an instance like the point in question. He left. Then someone picked up X's receiver and said, "Are you being waited on?" "Yes," was the brief reply, and she left. Number five lifted the receiver gently and said, "I'm Mr. X's assistant, can I do anything for you." This was so encouraging that the story was told carefully and in full. Sad, but true, this person didn't know just what to do, but, with evident relief, said, "Here's Mr. X, now, he will tell you what you want." For the fifth time the whole tale was told, with the question on the end, but Mr. X didn't know the answer. It was a simple question that A could have answered if he had had the information that was was available in X's office. So he hung up his receiver and went over to X's office and got the information himself. Query—What would a subscriber have done?—Philadelphia *Telephone News*.

SUBSTITUTION OF UNDERGROUND CABLES.

IN Liverpool, two working cables have had to be substituted by cables of a larger capacity of 10-lb. gauge. To cause the least amount of inconvenience to the subscribers working in the cables, the work was carried out between Saturday night and Sunday in each case; a few particulars of the cost, time, &c., may prove of interest to others who have similar work to perform.

Five hundred and eighty-seven yards of 153 and 102-pairs 20-lb. conductor was drawn out, and the same amount of 600-pair 10-lb. drawn in between 10 p.m. on Saturday and 6.20 the next morning. There were eight joints in the original cable, but only four were necessary in the new length, the lengths of the 600-pair cable pulled in being 203, 222, and 162 yards, the last length being pulled round a bend. The horses that were necessary to move the cable drums and tackle were utilised for pulling the cable out, and this proved very successful. The total cost to draw out the old cable, and drum it, &c., and to pull in the new, was 3·52*d.* per yard; this is at overtime rates. The man-hours per yard were ·197. One hundred and fifty subscribers were affected, and the whole of them were working by 8·30 on the Sunday night.

One thousand two hundred and fifty-nine yards of 102-pair 20-lb. cable were drawn out, and 1,269 yards of 300-pair 10-lb drawn in, making a total of 2,528 yards handled. The work began at 10 p.m. Saturday and finished at 7.0 a.m. Sunday. Horses were also used in this case. The cost of drawing out the old cable and putting in the new was 2·38*d.* per yard. There were 100 subscribers affected, and all of them were working by 8·30 p.m. Sunday. The man-hours per yard in this case were only ·135.

TWOPENCE FOR TALKING TO TIM.

THE following flight of fancy is taken from a daily contemporary:—

Last Saturday evening a gentleman entered my shop and went to the National Telephone Company's box, which has been erected on my premises. To my surprise, after getting his number, he called "Tim," loudly, three times.

It is often easy for me, during the quiet hours of the day, to hear the conversation of the person at the other end of the wire. On this occasion I distinctly heard three sharp barks, and the gentleman immediately hung up the receiver.

Seeing that I was amazed, he explained that he had trained his dog to act as caretaker, and answer the telephone bell when his master rang up the empty office.

One of the old-fashioned telephones, which does not require that the receiver should be taken off its holder, is fixed up, and under this Tim stands and barks that all is well with himself, and, consequently, with the office.

The Engineering staff are anxious to meet that "old-fashioned telephone which does not require the receiver to be taken off its holder" before the transmitter is placed in circuit.

THE TELEPHONE IN AN EMERGENCY.

CAUGHT IN THE COAL CELLAR.—BRADFORD BURGLAR TRAPPED.

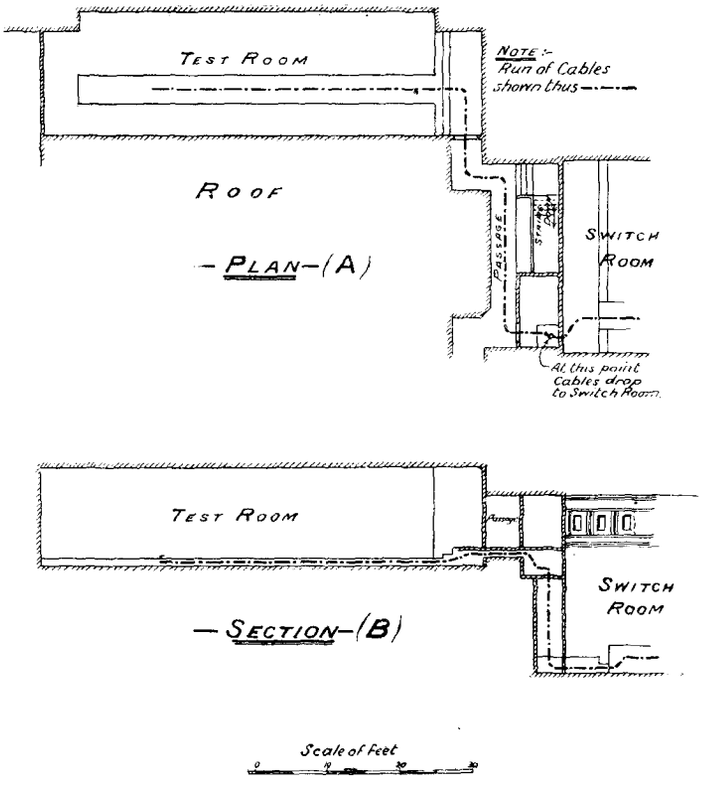
AT the Bradford Police Court, Fred Wallace (26), labourer, of no fixed abode, was charged with breaking into the house, 11, Sherbourne Road, occupied by Mr. Matthew Thompson Black commission wool comber, with intent to steal. A telephone message was received at the Town Hall to the effect that a burglar was in Mr. Black's house. Police-constable 62 Chatburn was immediately despatched by car, and he found the prisoner lying on the coals in the coal cellar. Prisoner had obtained access through the cellar grate, and the servant on hearing a noise had promptly raised the alarm.

THE FIRE IN THE ROYAL EXCHANGE TESTROOM, GLASGOW.

BY F. DOUGLAS WATSON, *Superintendent for Scotland.*

ON the evening of Saturday, December 16, 1905, the testroom in the Royal Exchange, the largest in the Glasgow District, was completely gutted by a fire which only lasted for an hour and a quarter. The wiring of the test frame being largely of the now condemned paraffined type, it is a matter of no surprise that so much damage should be done in such a short time, or that some operators who passed the door of the testroom about fifteen minutes before the fire was well alight saw no indication that anything was wrong.

The testroom is situate on the top floor of the Royal Exchange, and communicates by a lobby and staircase with the switchroom, which is on a lower floor of the building. The plan marked "A" and the section "B" show the relative positions of the two rooms.



The operators in the switchroom, although disconcerted by numerous lamps lighting up all over the switchboard, had no idea that the fire was actually in the same building until a member of the Fire Brigade walked in at the door and told them. The alarm was given to the Fire Brigade about 6.20 by an unknown passer-by from a street alarm in Royal Exchange Square, and about two minutes afterwards the firemen arrived, to find the flames bursting through the roof and mounting high into the air. Fortunately they prevented the fire from spreading, and it was confined to the testroom, not a single spark or even a drop of water getting into the switchroom.

Things looked bad enough, however, when I arrived about 7.45, and found Mr. VALENTINE, the District Manager, already there with several of his staff. The testroom was a mass of blackened ruins, everything dripping with water, and the Salvage Corps were busy baling out the water from adjoining rooms, which, being at a lower level, were knee deep from the copious streams poured on the burning mass by the Fire Brigade. In such circumstances it is not easy to detach oneself from immediate surroundings, and think out quietly and dispassionately the best course of action. But, however difficult, it is necessary. When the state of affairs was sized up it was realised that this short, sharp fire, in addition to obliterating the "Royal" as a local exchange, had cut off it and the whole Glasgow area from trunk communication, as all the Post Office junction cables passed through the Royal Exchange testroom. Further, Royal being the junction exchange for most of the other exchanges, they also, except for purely local calls, were for the moment out of service.

The District Manager devoted his energies first to organising the hurriedly collected labour staff and setting them to clear out the *debris* from the testroom. This work was completed by daylight on the following day, Sunday, December 17. It was smartly done, and made a good beginning in the work of restoration. I spent the next few hours telephoning from the testroom of the General Post Office, where every assistance was given me by the officials of the Department, first advising the General Manager of the disaster, and then communicating with London and other distant parts as to the men and stores required. By midnight the Engineer-in-Chief and his assistant, with several of the expert technical officers of his staff, were on their way north, and a large force of switchboard men, cable jointers, fitters, &c., from most of the big centres in the country were sent off, and arrived at various hours during the Sunday. Test cases from the Company's special "fire reserve" were speedily dispatched, along with quantities of other necessary stores from Head Office and elsewhere, and the unique resources of the Company in men and material were abundantly evident by Monday morning.

By that time a special staff was organised in two watches, night and day, each divided into "inside" and "outside" gangs, each subdivided again into the various sections necessary to keep the work in all departments going on steadily and evenly. Each watch was put under the control of a superior officer, and each subdivision was in the same way in charge of one man. On Sunday the rubbish, amounting to several tons, removed from the burned-out department, was quickly got rid of by means of a wooden chute, erected with the aid of long ladders, and reaching from the roof of the building right down to the street. The *debris* was shot down this in a few hours and carted off at once to a private yard, where a Salvage Corps man mounted guard over it until it was sold.

The Royal Exchange authorities were early represented on the scene by Mr. BEATSON, the Manager, and Mr. MANZIES, the Architect, and realising the urgent need for housing the new test-board they arranged to build a temporary wooden shelter inside the partially destroyed walls and roof of the original room. This was finished by Monday morning. By that time the new test case for 8,000 lines was erected, and its equipment with arrester strips and test jacks well in hand. By Sunday evening, 24 hours after the fire, jointers were busy joining on fresh lengths of A.D.C. cable to replace the ends burned off in the testroom. Some of these had been burned back across the street for some distance, and the first thing done here was to cut all the burned ends well back behind the damage and seal them to keep out the moisture. The weather was unfortunately very broken, and threatened to interfere seriously with the jointing operations on the roof of the building, but a shelter, extending over the whole area affected, was provided by means of tarpaulins, and lighted by small arc lamps, fitted up on the evening of the fire itself, by the aid of which night work was carried on until the job was finished. Meantime, the inside gangs were busy cutting off the burned ends of the inside cables connecting the testroom with the switchroom and joining on fresh ends, and by Monday evening we began to see the work, outside as well as inside, growing under our hands.

As a preliminary to restoring communication with subscribers, every jack in the multiple was plugged up—for this purpose ordinary paper sleeves cut into three were found effective—and half a dozen special service telephones were joined up in the switchroom to cope with the rush of enquiries which it was expected would be received from subscribers immediately joining up began again. This, while a wise provision, was not found to be required. The patience of the subscribers throughout the whole period of interruption was very marked, and there was not the enormous traffic in the way of enquiries which had been anticipated and provided for.

A most useful arrangement for securing that the switchroom should be advised of each reconnection promptly was devised by Mr. COOK. It will doubtless be utilised in dealing with similar cases of fire damage in future, and deserves more than a passing reference.

There were three points at which each line had to be handled

before a disconnected subscriber could get through to the exchange again. (1) The connection of the outside cable to the arrester, (2) the connection of the switchboard cable to the test jack, and (3) the "jumpering" or cross-connecting of these two points. The possibility of chaos if a close grip were not kept on these three points was obvious. Each was the work of a different gang under the charge of a different officer, and dealing with such a large number of lines it was necessary that each gang should work independently of the others. It was also most necessary that *immediately* a line was reconnected the switchroom should be advised, in order that the paper plug before referred to should be withdrawn from the multiple and that subscribers should get both inward and outward service. Mr. Cook's scheme was to deal with these by a system of triplicate tickets, and a printer was secured on Sunday who printed off a supply of small tickets in the following form:—

Subscriber's No. _____
Strip No. _____
Arrester No. _____

Outside cable connected _____
Cross-connected _____
Test jack connected _____

Verified _____
Date _____
Time _____
Initials _____

These tickets were in three series, all with the same printed matter, but each series had a distinguishing colour and size. The largest was white, measuring $4\frac{5}{8}$ inches by $2\frac{3}{4}$ inches; the next was pink, measuring 4 inches by $2\frac{3}{4}$ inches; and the third blue, measuring $3\frac{1}{2}$ inches by $2\frac{3}{4}$ inches. A large clerical staff worked all Sunday night writing a ticket of each colour for every line on the test case, whether direct, party, private, or junction, filling in on each the subscriber's number or name, strip number, and arrester number. On Monday morning these were distributed to the proper officers on the fire job, to be returned by them to a clerk in charge of the Ticket Department in the switchroom as each one was completed. The white tickets were given to those working at the connection of outside cables to the arresters, the pink tickets to those working at the connection of inside cables to the test jacks, and the blue tickets to the gang who were engaged on the cross-connecting. As each man completed a line he simply ticked the item on the ticket referring to his department and sent it down to the clerk in charge of the Ticket Department before referred to. Even this Ticket Department had to work night and day in two watches, and was a very important link in the chain of organisation.

It happened, of course, that hundreds of lines were reported joined up at one or two of the three points named before the third ticket arrived intimating the completion of the first circuit, and this involved the arranging of the tickets numerically as they were returned, in special boxes. The first set of three was returned and the line tested O.K. at 4.4 p.m. on Wednesday, December 20, rather under four days from the time of the fire. It turned out that the line was that of a small and obscure subscriber whose name I had never heard before!

This was the beginning of the end, however, and from that moment the joining up went steadily on at the following rate:—

500 subscribers working	... ...	December 23.
1,000 "	"	" 25.
2,000 "	"	" 29.
Work finished ...	... ...	January 13.

Altogether the stations and lines cut out by the fire were as follows:—

Subscribers' stations	3,745.
Junction lines	1,044.
Private lines	584.

There were in addition to these some odds and ends in the shape of fire alarms, electrophone circuits, &c.

The order of joining up which was settled at the beginning of the work, and in the light of actual experience seems to have been the best, was (1) junction wires from Post Office to all the other exchanges, (2) junction wires from one exchange to another which passed through the Royal testroom, (3) direct subscribers' lines, (4) party lines and private lines.

Shortly, the following was the programme followed:—

(1) Calling out of heads of departments, and through them as many as possible of the rank and file.

(2) Getting out lists of necessary stores and men.

(3) Ascertaining what proportion of these was available in Glasgow District.

(4) Telephoning Head Office for whatever was lacking.

(5) Organising staff into night and day watches.

This done, it was decided to go straight ahead with the job, ignoring all individual complaints. As usual, this rule had to be relaxed somewhat, but not much. It was soon realised that if a subscriber with, say, four flat-rate lines to one office should hear of his next-door neighbour, who had only one, getting that one through before *one* of his four was restored, there would be trouble—so a few selections necessary to avoid this were made. We also did what was possible to join up quickly all flat-raters who had private branch exchanges

Unfortunately our cable records were destroyed in the fire. Another set of records, kept in rather a different way and for a different purpose, proved very handy in the writing out of the tickets before referred to, and when the actual testing began, some rough records belonging to the faultsmen themselves were found of considerable service. We should have got through more quickly, however, with the restoration if the burned records had been available, and I am inclined to think it would be worth the additional cost to keep duplicate sets of records in different offices, or if only one set is kept to have it in a fireproof safe.

During the entire period of night and day working a conference of the heads of departments was held twice in the 24 hours with Mr. Valentine and myself, where difficulties were talked over and provided for; each department was thus kept abreast of the others, and the maximum rate of speed in the work of restoration all over secured. It was frequently found necessary, owing to unforeseen difficulties in some one department, to strengthen the staff there, and sometimes found possible to reduce it in another, and extra force from other districts, which at the beginning had not appeared necessary, had on certain occasions to be requisitioned. By the instructions of the Engineer-in-Chief, the testroom ends of the A.D.C. cables were not potheaded, but simply stripped back a couple of yards, and the stripped portion, with about a foot of the cable above, soaked in a bath of beeswax, and "formed" for soldering to the arrester strips. This was a shock to some of our ideas here in the matter of the handling of dry-core cables, but so far we have had no trouble with any of those so treated.

A gratifying feature of the whole experience was the great consideration shown by our subscribers. Although some were the full four weeks before they got their communication restored, there were very few really serious complaints. I attribute this in a large measure, first, to the fact that a circular was printed on the Sunday following the fire, and posted that evening to every subscriber in the area, giving intimation of the fire and the consequent breakdown of the service. It was a smart piece of work to get 25,000 circular letters *printed, addressed, and enveloped* in about twelve hours. A staff of over 40 of our Contract Department and others had to do without lunch on Sunday to get through with the addressing, but it was done and the circulars posted that evening. The Post Office were good enough to keep on special sorters in the evening to ensure prompt delivery of the circulars on Monday morning. In the second place, during the three weekdays following the fire the entire staff of the Contract Department was deputed to call on the subscribers whose service was cut off, and express verbally and at greater length the Company's regret for the trouble and inconvenience the fire was causing them. They all had instructions to endeavour to get an interview with principals, and they generally succeeded. This was a little attention, supplementary to the intimation by circular, which was much appreciated by the subscribers. It was to be expected we should have malcontents among the subscribers, and some there were, but they were few and far between. One gentleman seemed very much aggrieved that his competitor a block or two away should be able to use his telephone. He was on another exchange, and evidently the Company suffered

in reputation for fair dealing because that exchange was not burned out too.

Any account of our experiences would be incomplete without a reference to the enthusiasm and energy shown by every member of the staff engaged in the work of restoration. The staff brought from distant centres and from Head Office vied with each other and with those on the spot in their efforts to get the work finished, and though mistakes were doubtless made in details, mistakes which in such a time of high pressure are to be expected, and I do not think can be entirely avoided, the fact that *all* the circuits were restored to full working order on January 13, exactly four weeks after the fire, is not unsatisfactory. I was personally in pretty close attendance during the work of restoration and saw the thing for myself, and if it should be my lot to have another big fire I would ask for nothing better than the spirit manifested by the staff engaged on this one, and nothing more satisfactory as regards the delivery of the stores required for such a job than the promptitude and accuracy with which every demand was met by the Stores Department in London. Not an hour was lost through shortage either of men or material.

OFFICE ORGANISATION.

Paper read before the Glasgow Telephone Society, by J. ANDERSON *and* J. R. THYNE.

BEFORE proceeding with the paper, I should like to give expression to the regret we must all feel that Mr. ANDERSON, who is so thoroughly in touch with our subject for this evening, has been prevented from giving us an account of his experience.

As, however, the office is really the hub of the system, the department which serves as the connecting link between all the other departments, it was felt that a discussion of the methods employed there would not only prove profitable, but would probably be of interest to those of the staff not in close touch therewith. While it is true that this is an age of specialists, that it is impossible for any one man to become an all round authority, and that a little knowledge is a dangerous thing, it is, I think, equally true that an acquaintance with *all* the machinery enables a man to deal much more intelligently and satisfactorily with that part directly under his own control.

On these grounds it was thought inadvisable to pass the subject over, and the following paper, built on the foundation laid by Mr. ANDERSON, is now set before you. I hope that the shortness of the time in which it had to be prepared will serve as a sufficient excuse for its deficiencies.

As everybody knows, the bookkeeping suitable for the conduct of ordinary commercial transactions does not meet *our* necessities, and the system now in operation is one which has been built up to meet the peculiar requirements of the telephone business. Further, as the officers who have graduated from the clerical staff well know, this system did not grow up in a night, but is the result of many years' experience, and the outcome of much thought on the part of those engaged in the work. The powers that be cannot be charged with conservatism in this matter, for the changes have been frequent, and as these have generally been for the better, the result is that now our system is one which, calling for the minimum of labour while at the same time supplying everything necessary in the way of detail, would be hard to beat.

It is usual to find among technical men a tendency to underrate the importance of clerical work, and I cannot do better than quote the words of another writer on a kindred subject:

> "The subject of clerical work has a wider application than may at first be supposed, for a little reflection and examination will show that a certain amount of clerical work is inseparable from the working of every department of the Company's business.
>
> "It is obvious that to provide a permanent record of the work and progress of each department, certain accounts must be carefully kept of the vital transactions, and, while it is very important that no unnecessary clerical duties should be imposed upon those departments which are primarily concerned with the more technical parts of the Company's business (as, for example, the engineering and electrical staffs), yet it is in the highest degree essential that the clerical portion (whether it be great or small), shall be recorded promptly, fully, and accurately by every member of the staff concerned.
>
> "The importance of promptly and accurately recording the work carried out, and seeing that it is done in accordance with the official instructions, will be recognised still more clearly when it is remembered that however skilled the engineering work, and however expert the electrical portion, the Company derives no direct financial benefit until the rentals and other charges due to the Company have been properly scheduled, invoiced, and collected."

In a recent paper Mr. TAYLOR gave us an interesting description of the methods by which contracts are secured. I propose to advance from that point and describe how these contracts are dealt with when passed to the office, taking in the main features of our bookkeeping system, and indicating as we go on the organisation of the various branches of the clerical staff.

The contract, after being received and dealt with by the Contract Department, is passed direct to the office, where a Works Order is issued for the necessary work. Here we leave the contract, for everything now depends on the Works Order, which forms the foundation of our bookkeeping. It is consequently a record of the very highest importance.

The Works Order is the link which binds the technical and clerical branches of the work, for at its issue it is the authority to carry out the work, and on its return it brings information from the technical branches for the necessary entries in the books. On the one hand no work can be undertaken without the Works Order, and, on the other, no alteration of any moment can be made in our books without its sanction.

For the accuracy of these records we are dependent upon the technical branches, and we are almost entirely at the mercy of the officers charged with the duty of filling up these forms. Any error, unless promptly discovered, becomes an error in the records, and may lead to serious consequences. Thus, an error in a date may cause a loss of revenue, and an omission of a portion of material used may result not only in loss of revenue, but in that material being lost to the Company. Even when it is apparent that an error has been committed, its discovery and correction mean expenditure of time and trouble—sometimes a great deal of both.

The Works Order is divided into three portions:

(1) Pink slip for line work,
(2) Green slip for instrument work,
(3) Advice note for exchange work.

The Works Order Books are well bound and contain three orders to a page. Carbon paper is used, so that at the one writing pink and green slips are filled up, and, in addition, a permanent copy is made which is retained in the Works Order Book; this, in addition to the information contained on the pink and green slips, shows the number of the contract (which has been filed away in numerical order), the rental to be paid by the subscriber, &c. These three orders, pink, green, and advice note, are, as we have said, issued to the Engineering, Instrument Fitting, and Exchange Departments respectively.

In carrying out orders for new lines, I might mention two of the principal points which we should all keep before us.

First.—To complete the connection as early as possible. Every day saved means a day's revenue gained to the Company.

Second.—To spend as little time and material on the work as possible. Cheapness is not, of course, the sole consideration, but the necessity for economy combined with efficiency should be kept before us.

We will now pass on to consider what happens when, the work completed, the Works Orders are returned to the office.

They are returned to the Works Order clerk, who issued them in the first instance, and who is one of a staff of seven clerks comprising the Cost Department, under the charge of the Cost clerk. This department not only deals with the Works Orders, to the extent of about 15,000 per annum, but deals also with wages, estimates, and all questions relating to costs and expenditure.

When the pink and green slips are returned, the dates when the line was completed and the instrument erected are carefully recorded on the permanent copy of the Works Order, likewise the date con-

nected up in the exchange when the advice note is returned by the exchange electrician. In the event of an unreasonable time elapsing between the issue of a Works Order and its return, it is the duty of the Works Order clerk to direct the attention of the head of the department concerned to the fact, so that the work may be urged and an explanation of the delay obtained. When this is done, the Works Order clerk is able to explain matters satisfactorily to the subscriber when he rings or writes, as he frequently does. The importance of keeping this officer well informed as to the progress of work cannot be over-estimated. He is the Company's mouthpiece, so far as this is concerned, to the public, and it much improves the relations between the Company and the subscriber if an intelligent explanation can be at once given of any point the latter may raise.

When the Works Order clerk has dealt with the three parts of the order, these are pinned together and passed to the Rental Register clerk.

The same procedure is applied to all Works Orders whether for removals, additional apparatus, or changes of number.

The new customer has now been connected up, and has become a subscriber. The Company has, so far, fulfilled *its* part of the bargain, and arrangements have now to be made so that the subscriber may be asked to do his share, and to do so annually, quarterly, or monthly, as the case may be. This work is deputed to the Rental Register Department, which consists of nine clerks, and this staff not only deals with the Rental Registers and the returns pertaining thereto, but also has charge of the Wayleave Records and the Subscribers' Directory.

The Rental Registers are divided into different sets, exchange line, private line, "A" to "B" line registers, &c.

A separate book, or part of a book, as the case may be, is set aside for each month of the year.

When the Rental Register clerk receives the completed Works Order he, with the permanent copy before him, makes the entry into the proper register. The date completed, the mileage of line erected, &c., are taken from the pink and green slips, while the amount of annual rental, the contract number, &c., are taken from the permanent copy of the Works Order. An account is made out and sent by him to the subscriber, and an entry is made on the No. 3 Return, which shows the additions made during the month to the Company's annual revenue, the number of stations, the number of lines, the mileage of wire, and the number of instruments; this information, being tabulated monthly on the No. 3*b* Return, shows the total under any of these headings at the end of any month. Ceased subscribers, with the ceased rental, mileage, &c., are shown in a similar manner on the No. 3*a* Return.

In the cases of message, measured, and omnibus subscribers, where the subscriber is debited with one penny in respect of each call, or where he has agreed to pay for all calls in excess of a certain number, the Rental Register clerk makes out a card on which the calls are to be recorded; this card he passes into the custody of the Record Department.

In the cases of 10-party stations and call offices no rental is paid by the subscriber, but the coins put in the boxes at the instruments have to be collected monthly. In the case of the former, if the coins collected do not equal twopence per day for the month, the balance has to be obtained from the subscriber under his contract guarantee. Entries for such service, therefore, are not made in the Rental Registers, but in special books, the 10-Party Line Fee Book and Call Office register. Both books are looked after by the Record Department. It was suggested to me by Mr. Rowan, the Head Office Auditor, while in Glasgow recently, that a considerable saving would be effected if call offices were visited less frequently, except in those cases where the apparatus is largely at the mercy of the public—railway station call offices for instance. With the large number of call offices in the Glasgow District it would be interesting to know whether this is practicable, and how it would affect the cost of collecting.

As the Rental Registers are so arranged that all the rentals due in one month are together, the sending out of the accounts regularly as they fall due is a very simple matter.

The Rental Registers contain a permanent record of all information that may be required regarding the subscriber's account, and it is from these books that the Government officials arrive at the amount due from the Company in respect of royalty. Any subscriber's entry may be easily referred to by means of a suitable index.

In order that the subscriber may derive the full benefit from his telephone connection, it is necessary that his name should appear in the Telephone Directory, and that he should be supplied with a copy of each edition as it is issued. This, as we have already said, is also looked after by the Rental Register Department. The books containing the permanent copies of the Works Orders not only show full particulars regarding new subscribers, but record all changes due to subscribers removing, altering their service, &c., and they are, therefore, the source from which the Directory is compiled. The card system is used, and for every entry in the Directory we have a card, giving particulars of the entry, particulars of extra entries and special type entries. These cards are written up daily from the Works Orders issued the previous day, and the particulars are transferred from the cards to a special directory interleaved with blank paper for the purpose. Being kept up daily, this directory can be sent off to the printers on very short notice. The card system was introduced comparatively recently, and answers the purpose admirably. Previously the matter from the Works Order was copied directly in the interleaved directory, but as this directory had to go to the printers it was not always available to keep the record up to date. Again, there was no accommodation in the interleaved directory for particulars of the charges payable by the subscribers for special entries, &c., nor for quoting our authority for making a subscriber's entry in a particular manner, and this was a serious inconvenience.

Again, when a subscriber ceases, his name must be deleted from the Directory. When a subscriber appears under one name only, this is easily done, but under the old system there was no means of knowing when a ceased subscriber had an extra entry which should also be deleted; this difficulty is also met by the card system.

The card index system provides a complete record of all the Company's business, kept thoroughly up to date, and filed in the most available manner possible. The natural query here would seem to be—Are we taking full advantage of the facilities thus provided? or, is an extension of the system not desirable? Perhaps something will be said upon this point later.

Delivery sheets divided into districts and streets are also kept up to date daily, so that immediately a new issue of the Directory is received, we are in the position to hand these over to our contractors and instruct them to go ahead with the delivery. The subscriber's signature has to be obtained as an acknowledgment of the receipt of a copy of the Directory, but by gumming fresh slips over the old signatures we make the one set of sheets serve for four deliveries.

Reference has been made to the Record Department, which deals with the recording of all calls made by message rate subscribers, as well as with automatic box records. This department consists of seven clerks (six of them girls) under the Record clerk.

The operators in the recording positions in the exchanges are supplied with specially printed forms for recording all effective calls. These forms are sent to the Record Department in the office, where the calls are recorded on subscribers' cards by means of the insertion of the date in small squares provided for the purpose. The number of squares on the cards corresponds with the number of calls contracted for by the subscriber, and when these squares have all been filled up future calls are entered on a white card, which signifies that the subscriber has to pay extra for these.

The totals appearing on the operators' sheets are summarised in a book called the "Daily Summary Book," while the total calls made as per each subscriber's card are entered in a book known as the "Monthly Balance Book," a special column being provided here for excess calls, *i.e.*, calls for which extra payment has to be made. The total appearing in the Daily Summary Book should agree with that appearing in the Monthly Balance Book, and this affords a sufficient check on the posting of the calls from the operators' records.

The amount due for excess calls is carried forward in the Monthly Balance Book until the end of the subscriber's year, when an account is sent to the subscriber and payment therefor secured.

The subscriber who does not settle his account promptly is dealt with by the Outstandings Department, whose work lies in the sending of notices or reminders to subscribers who have failed to

make payment of the amounts due, and in calling on them when necessary.

All rentals appearing in the Rental Registers and unpaid at the end of the month in which they fall due are entered on the No. 2 Return, which is thus a statement of rentals overdue. For the collection of the amounts appearing in this return, the Outstandings clerk is responsible. He is further responsible for the collecting of the fees from call offices and 10-party stations appearing in the Call Office Register and 10-Party Line Fee Book, and the amounts due by message rate subscribers in respect of calls appearing in the various Monthly Balance Books.

For this work the Outstandings clerk has under him a staff of two clerks and nine collectors. Under an arrangement recently made, four of these collectors will be reserved exclusively for the collection of fees from automatic boxes, and they are receiving sufficient electrical training to enable them to clear minor faults on these boxes. This will save to a great extent the cost entailed by separate visits on the part of the electrical staff.

Some idea of the extent of the operations of this department is gained when it is stated that the four collectors just referred to will make approximately 20,000 collections in the year. The other collectors will make about 27,000 visits and 12,500 collections a year, making a grand total of 47,000 visits and 32,500 collections.

All the cash collected by the Outstandings Department, as well as that paid over our own counter by subscribers, is dealt with by the Cash Department, which is worked by the cashier and five clerks.

From the receipts given to subscribers, the Cash Book is written up and the payments are then posted from this Cash Book by the Rental Register clerks to the Rental Register Returns, and by the Record clerks to the 10-Party Line Fee Book, and so on. The Cash Department also deals with the payment of wages, accounts, subscribers' complaints relating to charges, and with all the books and returns of cash receipts and payments.

At this point we shall take leave of our subscriber. We have provided him with his connection; we have inserted the necessary particulars in the Rental Registers; we have secured that, if necessary, his calls will be recorded and that the fees will be collected from his automatic box, and we have also secured that his rental will be collected and posted to the Rental Registers *via* the Cash Book. The entries made in the books ensure that in future the subscriber will be dealt with under the usual office routine.

(*To be concluded.*)

TELEPHONE COMPETITION.

A MOST interesting report has recently been issued in New York, dealing broadly with the subject of competition in furnishing telephone service. The report is made by the Merchants' Association of New York, which is a body of the leading business men of that eminently business community. A committee of this association last year investigated the working of the telephone service in New York and conducted a detailed examination both of the books and of the plant of the New York Telephone Company, and made a report which was extremely favourable to the management of that company. The plant and organisation were found to be of the highest efficiency, the service conducted with the utmost speed and regularity, and the financial standing and general management of the business were found to be thoroughly sound. It is interesting to note that in this report the Merchants' Association stated their opinion that a telephone company, in view of the risks of the telephone business, was entitled to net earnings of not less than 10 per cent. on the capital invested. Following up the subject of telephone service generally, the committee of the Merchants' Association conducted a detailed investigation into telephone conditions in American cities where there are two competing telephone systems. In New York, as is well known, there is no telephone competition, but in several of the other large American cities and in many of the smaller towns and cities there are two competing telephone services. An expert investigation of the telephone conditions was made in twelve of these cities, including such important places as Cleveland, Chicago, St. Louis, Philadelphia, and Baltimore; many business men and public officials were interviewed, and in addition to this personal investigation some 2,000 circular letters of inquiry were sent out and 1,200 replies received. As a result of the study of the actual conditions and of the data collected, the committee of the Merchants' Association report emphatically against the advisability of competition in the telephone service.

The report states that competition is not an effective means of regulating telephone rates, as it results in increased outlay for telephone service on the part of a large proportion of telephone users, while by establishing two separate telephone systems it diminishes the facility of general intercommunication. On the general results of establishing a second telephone system in any city the report speaks so forcibly that we quote in full.

> "The effect of two rival telephone systems in one city is to divide the population into two parts, without means of telephone communication with each other except at excessive cost. While a single system promotes general intercommunication, two systems make it impracticable. Two systems therefore greatly restrict the utility of the telephone, seriously impair its value, and impede its commercial development.
>
> "It has been shown that a single system can perform the desired service much more efficiently and at less aggregate cost than two systems can. It is obvious that two systems involve extensive duplication of plant and organisation, which entails a heavy additional burden of fixed charges and operating expenses, much of which would be unnecessary if the service were performed by a single system. This duplicated outlay, being in excess of the amount really necessary to perform the service, is an economic waste. In telephone operation no compensatory benefits to users in the form of lesser cost of service or increased efficiency have yet developed to justify this waste. The dangers coming from it are easily seen. Unless it is provided for in the charges exacted from consumers the capital investment will be gradually eaten up. In the meantime, as abundant experience in railroad competition has shown, equipment will be permitted to deteriorate, operating expenses will be reduced below the proper limit, and the efficiency of service will be lowered.
>
> "In the opinion of this committee, competition in telephone service is not a public benefit and not a useful means of regulating telephone charges. As shown above, little or no benefit accrues to any part of the public in the way of reduced rates, many consumers are compelled to increase their aggregate outlay, the utility of the service is cut in half, expansion made difficult, the efficiency of the service threatened and the capital investment endangered.
>
> "Competition in telephone service does not offer a choice of benefits, but compels a choice of evils—either a half service or a double price."

The Merchants' Association committee would find the conditions so ably described and expounded in the report from which we quote thoroughly exemplified in the few towns in this country where municipal telephone systems have been established. In every case the municipal subscribers are to a large extent duplicates of National subscribers; that is to say, the establishment of the municipal systems has compelled many business men to pay for two telephone services instead of for one only. This is the way in which the municipalities have saved money to the community over whose interests they preside. The number of actual new subscribers which the municipal telephone undertakings have added to the telephone system of the country is quite insignificant and has been added at a very large expenditure of capital. The waste of capital through duplication of plant and organisation, the inconvenience to the public of two separate telephone systems in the same place, the reduced facility of general intercomunication and the economic waste due to a double outlay on the same service, are all exemplified in the five places in this country where there is telephone competition. That these facts, undreamed of in municipal and political circles five years ago when the municipal telephone agitation was at its height, are gradually permeating the minds of those responsible for the municipal systems is now becoming evident; whether the waste of capital and general inconvenience arising from the municipal telephone competition will be continued much longer only the future can decide.

NEWS OF THE STAFF.

THE following appointments have been made:—

Mr. H. S. DISTIN, District Manager, Swansea, to be District Manager, Exeter. Mr. Distin entered the Company's service in October, 1892, and was under Mr. Sinclair, the then Engineer-in-Chief, until he was appointed District Manager at Swansea in June, 1901. There has been competition at Swansea since 1903, but the National system is well in the lead and gets the major part of the new business.

Mr. T. A. BATES, District Manager, Portsmouth, to be District Manager, Chester. Mr. Bates entered the Company's service in 1891, and was made District Manager, Jersey, in 1894; Local Manager, Isle of Wight, in October, 1895; and District Manager, Luton, in February, 1901. He became District Manager, Portsmouth, in November, 1902, and has had nearly four years of strenuous competition, which, as elsewhere, has resulted in a National victory. To this result Mr. Bates has contributed his full share.

AT the district office on March 14 the members of the staff presented a handsome silver salver to Mr. Bates, engraved with the following inscription:—"Presented to T. A. Bates, Esq., from the Portsmouth and Isle of Wight staff of the National Telephone Co. Ltd., on the occasion of his transfer to the Chester district, March, 1906."

Mr. W. E. GAUNTLETT, District Manager, Gloucester, to be District Manager, Swansea. Mr. Gauntlett has been in Gloucester since 1893, being first Local Manager, and becoming District Manager in 1900. He entered the service in 1887.

Mr. J. STIRLING, District Manager, Chester, to be District Manager, Portsmouth. Mr. Stirling entered the Company's service in 1884 as operator at Forfar, and has since successively filled the offices of Chief Clerk, Sheffield; Local Manager, Hastings; and District Manager, Ipswich and Chester. At Portsmouth he will get his first experience of competitive conditions, but the Portsmouth National system has long held a commanding lead over the municipal system. On the occasion of his transfer he received from the staff at Chester a farewell presentation which took the useful form of a gold fountain pen.

Mr. D. B. FULTON, Local Manager, Belfast, to be District Manager, Gloucester. Mr. Fulton entered the Company's service in November, 1889, and was Engineer in Dublin in 1899 and at Belfast in 1902. He was made Local Manager of the latter town in 1903.

Mr. A. B. GILBERT, District Manager, Exeter, to be Chief Engineer, Glasgow. Mr. Gilbert entered the Company's service in 1890; was Inspector, Birmingham, in 1895; Local Manager, Derby, February, 1896; Local Manager, Nottingham, June, 1899; and thence was transferred as District Manager to Exeter in November, 1902. The post of Chief Engineer at Glasgow is a new one, and, in view of the large development and special conditions at Glasgow, the work will be of a responsible nature.

Mr. H. H. BROOMHEAD, Local Manager, Middlesborough, to be Local Manager, Belfast. Mr. Broomhead entered the service in November, 1892, and has been for some years Local Manager at Middlesborough. He was presented with a massive pair of bronzes on Friday evening, March 16, by the staff of the Durham district, on the occasion of his departure for Belfast. On the following day he was presented with a large framed photograph of the Middlesborough operating staff.

Mr. F. H. BARBER, Contract Agent, Nottingham, to be Contract Agent at Birmingham. Mr. Barber entered the Company's service in 1890 at Birmingham as an apprentice, and from 1900 to 1905 he was Local Manager at Rotherham. For a short time he has been in charge of contract work at Nottingham, and he will find ample scope for his abilities in busy Birmingham.

Mr. W. HAIMES, Contract Agent, Portsmouth, has been appointed Contract Agent at Nottingham. Mr. Haimes has been many years in the service, and was formerly Chief Clerk to the Superintendent for Ireland. He has had valuable experience at Portsmouth, where the National system has been put far ahead of the municipal, and is expected to do great development work in the Nottingham district.

Mr. S R. VAUGHAN, Inspector, Longton, to be Observation Officer, Birmingham. Mr. Vaughan has been in the service since August, 1898, beginning at Wolverhampton as an apprentice. Inspector GRIFFITHS, of Northampton, has taken the place of Inspector VAUGHAN in the Potteries.

VARIOUS NOTES.

Inspector DEAKIN, who has had a serious attack of typhoid fever, has returned to work again.

Mr. F. W. TAYLOR, District Manager, Brighton, was the recipient last month of a handsome service of plate, consisting of four convertible *entrée* dishes and a revolving breakfast dish, presented by the Brighton staff as a mark of esteem. During the period of Mr. Taylor's supervision of the Brighton district, now close upon two years, the conditions of work have been most onerous, owing to the keen competition with the Brighton Corporation and to the rapid extension of the Company's plant, and it was generally felt by the staff that a testimonial of this kind would form an appropriate acknowledgment of the unfailing kindness and courtesy extended by Mr. Taylor to the whole of his staff during a time of much stress. The proposal to make the testimonial was taken up with enthusiasm, and all branches of the service contributed. Nothing could more clearly show that Mr. Taylor, while successfully carrying out the work entrusted to him, has at the same time gained the respect and esteem of the large staff under his control.

Mr. S. M. RICKETTS has been appointed Inspector-in-Charge of the Lewes area, Sussex, and took up his duties on February 26. The area includes the towns of Newhaven and Seaford, the headquarters being at Newhaven, which is the most central point. These places form part of the Brighton centre.

Mr. T. C. RHODES, Local Manager at Guildford, has been appointed to the Maidenhead centre.

Mr. F. S. LETTY, Inspector-in-Charge at Dorking, succeeds Mr. T. C. Rhodes as Local Manager at Guildford.

Mr. J. C. BACON, of Folkestone, has been appointed Inspector-in-charge at Dorking.

East Yorks.—The following transfers of staff have taken place in this district recently:—

Mr. A. W. HYDE, Local Manager at York, has been transferred to Grimsby to assist the Local Manager in the new underground scheme now in construction.

Mr. A. BROWN, Inspector-in-Charge at Otley, is promoted to Local Manager at York.

Mr. A. E. JONES, Inspector-in-Charge at Hessle, has been promoted as Inspector-in-Charge to Wakefield in the Mid-Yorkshire district.

Mr. W. H. TREZISE, District Office, Hull, promoted to Inspector-in-Charge at Hessle.

A cricket club has been formed here, with the District Manager, Mr. C. C. Worte, as president. A good list of fixtures has been got together, commencing with a staff match "married *v.* single" on May 12. An inter-staff match with the Mid-Yorkshire district has also been arranged for June 30, to be played at Leeds. The hon. secretary of the club is Mr. C. E. Platts, District Office staff.

Mr. JOHN ASHTON, District Manager, Leicester, has returned to his office after a month's absence, due to a severe attack of appendicitis. Though Mr. Ashton's health has been much improved by a change of air, it is feared that his recovery is not yet complete.

Mr. C. H. ASHBY, Local Manager for Lincoln, who took up Mr. Ashton's work during the illness of the latter, has returned to Lincoln. Mr. Ashby expressed himself quite impressed with the methods of working in vogue at Leicester.

Mr. F. ALBANY, Chief Clerk, Contract Department, Portsmouth, has been promoted to be Contract Agent at Portsmouth.

Mr. H. J. ALLEN, from the Brighton Contract Department, has been appointed Contract Agent at Norwich.

Mr. E. J. T. LEANEY, of the Brighton Contract Department, has been appointed Contract Agent at Southampton.

Mr. F. W. GEORGE, formerly Canvasser at Weymouth, has been appointed Contract Agent at Bournemouth.

Mr. H. DICKINSON, Assistant Engineer, Southampton, has been appointed Local Manager at Winchester.

Mr. J. T. BIANCHI, Wayleave Officer, Weymouth, has been appointed Local Manager at Salisbury.

Mr. S. MOODY, Local Manager, Salisbury, has been appointed Local Manager at Luton.

Mr. W. F. MARGASON, of the Engineer's Office at Leicester, has resigned from the service. He sails for Canada shortly, and carries with him the good wishes of the Leicester staff.

Mr. J. C. BACON, Chief Inspector at Folkestone, has been transferred to Leatherhead (Surrey) as Inspector-in-Charge. Mr. Bacon first entered the Company's service at Canterbury in September, 1898, and was subsequently transferred to Folkestone, where, in January last year, he attained the rank of Chief Inspector.

Mr. A. E. BALL, lately Head Bookkeeper in the Liverpool district office, has been appointed Chief Clerk at Plymouth. He left Liverpool to take up his new duties on March 2. Mr. Ball entered the Company's service in 1896, and has been through the various grades in the district office, having occupied his present position since September, 1903. Prior to leaving Liverpool he was presented by the members of the Liverpool staff with a handsome gold watch-chain. The presentation was made by the District Manager, Mr. E. J. Hidden, who wished him health and success in carrying out his new duties. Mr. Ball suitably responded.

R. H. GILLILAND, Switchboard Inspector, has been transferred from Belfast to Dublin.

Mr. G. BATCHELOR, Assistant Engineer at Brighton, has been appointed to Southampton. Mr. Batchelor has been in the service since March, 1887.

NOTTS FACTORY PROVIDENT FUND.—As the outcome of the collection made at the factory on behalf of the *Nottingham Guardian* Fund for the relief of wounded soldiers during the Boer War, when £31 was collected, the above fund was instituted in order to aid local charities, members of the staff subscribing the sum of one penny per week. The amount thus collected during the past six years is £292 9s. 10d; the sum distributed as the result of last year's effort was £50 10s.

MEMBERS of the staff will be sorry to learn that Mr. E. Hare, of the General Managers' Office (Statistical Department) has been laid up with typhoid fever since the latter part of January.

KEIGHLEY.—Mr. T. PICKLES, a junior clerk in the Keighley Local Office, is to be congratulated on his success in obtaining a South Kensington first-class certificate in Machine Construction and Drawing.

Mr. F. W. DICKINSON, of West Hartlepool, who has been appointed Inspector-in-Chief at Durham, was presented on the 20th inst. with a case of drawing instruments and a fountain pen.

OBITUARY.

WE regret to record the death at Brighton of Mr. ANDREW RUSSELL, a popular Wayleave officer. Mr. Russell was a long time in Liverpool and was transferred to Brighton in May, 1904. He died on March 12 after a severe illness. He is much regretted by all, having won the affection of his colleagues by his kind disposition and constant good humour. The annual dinner of the outside staff, which had been fixed for March 16, has been indefinitely postponed in consequence of Mr. Russell's death.

STAFF GATHERINGS.

Dublin.—At a meeting of the staff held on the 21st instant, it was decided to have an excursion on June 16 next to the Scalp and Enniskerry, co. Wicklow. The committee appointed are Mr. W. Lyall, Mr. A. Bury, Mr. G. Hunt, Mr. D. Kirkwood, and Miss A. Duggan. Hon. secretary and treasurer, Mr. T. J. Early. A Contract Department was started on February 1.

Keighley.—The staff of the Keighley district held a very successful social evening on Thursday, February 22. About 60 of the staff and their friends were present. The proceedings began with a whist drive, the prizes being won by Mr. Wilman (Bradford) and Miss M. Russell (Skipton). Mr. T. Pickles (Keighley) and Miss Hudson (Crosshills) were the winners of the consolation prizes.

After the tables had been cleared the remainder of the evening was spent in a convivial manner.

Mr. Gregory (Local Manager) presided, and in a few well chosen remarks referred to the growth of the Company's system in the district. He thanked the various officers who had worked to make the gathering such a success, and specially the hon. secretary (Mr. E. Walker). On the motion of Mr. E. Parkinson, seconded by Mr. F. Bastow, votes of thanks were accorded to Mr. and Mrs. Gregory (the latter for presenting the prizes) and to the artistes for their services.

Mr. J. Stones (Leeds), Mr. J. Regan (Keighley), Miss Russell (Skipton), and Miss Bacon (Keighley) contributed songs, and Mr. F. Bastow gave selections on the phonograph.

Dancing was also indulged in—Mr. E. Parkinson making an able M.C.

It is hoped to make the event an annual one.

Manchester.—On February 23, 1906, the Manchester staff held a "social evening" at the Midland Hotel.

The programme comprised concert, dance, and whist drive, and the proceedings lasted from 8 p.m. to 2 a.m.

The Midland Hotel is noted as one of the finest appointed in the kingdom, and with the large attendance of 600 the fine suite of rooms presented a brilliant appearance. An interesting feature of the gathering was the presence of the Assistant Provincial Superintendent and his wife (Mr. and Mrs. Prout). There was also a large number of visitors from neighbouring districts, including Mr. and Mrs. Hidden, of Liverpool, and Mr. and Mrs. Pugh, of Oldham.

The complete arrangements which had been made for the occasion resulted in a most enjoyable evening, and the committee responsible are entitled to much praise for the success achieved.

A meeting of the Manchester Telephone Society took place on Tuesday evening, March 20th. It was largely attended. Mr. F. Gill the Engineer-in-Chief read a paper on "Impressions Gained in the United States and Canada."

Hanley.—The last two meetings of the Telephone Society have been occupied with a paper by the Assistant Engineering Inspector, Mr. Frost, and the discussion thereon. The first meeting was taken up entirely by the paper, and on the second the discussion was opened by the District Manager and continued by various members of the staff, Mr. Frost winding up the debate. The paper dealt in an exhaustive manner with nearly all the important details of overhead construction, and was very much appreciated by the staff generally. The next, and probably the last, meeting of the society for this session will be on the 6th prox., when a paper will be read on Bookkeeping by Mr. Schofield, the Chief Clerk, and another on Primary Batteries by Mr. H. Watkin.

Birkenhead.—The district hope to hold their general staff picnic at Eccleston Ferry, and the committee have much pleasure in announcing that this gathering, now being organised, will take place on Saturday, May 26. The party will travel by train to Chester, and will proceed up the river Dee to Eccleston Ferry, where it is hoped they will partake of an enjoyable high tea, after which various outdoor games and sports will be indulged in. If the weather be propitious there can be no doubt that the whole company will benefit from their visit to this ancient and interesting city and its salubrious neighbourhood, and will return with renewed vigour to their onerous duties.

Durham.—The second annual dinner of the district staff was held at the the Hotel Metropóle, Stockton-on-Tees, on Friday, March 2, Mr. J. W. Swithinbank (District Manager) presiding. The toast of "The National Telephone Company" was proposed by T. Neil, Esq. (North Eastern Steel Co., Ltd.); the Chairman responding. Songs and recitations were rendered during the evening by Messrs. Dunn (Middlesborough), Wade and Fuller (Stockton), and Cockshott, Ryan, Dickinson, and Paxton (West Hartlepool). The toast of "The Visitors" was given by Mr. T. Hann (Chief Clerk), and E. F. Jarvis, Esq., responded. Other interesting speeches concluded a successful and enjoyable gathering.

Nottingham.—A progressive whist party and dance took place on Saturday, March 3rd, at the Arboretum Rooms. The event was well attended. The Local Managers at Nottingham, Derby, and Lincoln, and their respective staffs were present. Representatives from the Nottingham factory were also present. The total attendance was 170. A most enjoyable evening was spent. The programme carried out was as follows:—

Whist drive from 6.15 to 8.45.
Supper and presentation of prizes, 8.45 to 9.15.
Dance, 9.15 to 11.15.

Considerable merriment was caused by the District Manager (Mr. Williamson) carrying off the booby prize, with a score of 97.

Dancing began shortly after supper, and was kept up until 11.15, when the party broke up.

This event was the initial effort of the kind organised by the Nottingham district as a whole, it was voted a complete success and will be long remembered in the annals of the district.

Glasgow.—The National Telephone Society, Glasgow and West of Scotland Districts.—This society completed, at the end of February, a very interesting and instructive course of lectures and papers on various phases of telephone work. The course comprised eight papers—six contributed by members of the local staff, and two by members of the Head Office staff. The two latter are deserving of special mention, and the members of the society are indebted to the management for so readily responding to the request for the writers' services, and to Messrs. Watts and Cohen for their admirable treatment of their respective subjects.

The interest throughout the course was well maintained, and the object of the society—the enlightenment of members of all branches of the staff as to the work the various departments are doing—has been well realised.

The social aspect of the society's existence was not lost sight of, and the members spent together, under the chairmanship of Mr. W. A. Valentine, President of the society, a very enjoyable evening on March 23.

The Glasgow general staff held their second dance of the season on Thursday evening, March 15, at the Prince of Wales' Halls, Sauchiehall Street. Over 80 couples attended, and after the reception, dancing was engaged in with much spirit till the early hours of the morning. The committee worked hard for the success of the evening, and were amply rewarded, as a most pleasant and enjoyable time was spent by all present.

London.—The tenth annual Metropolitan staff dinner took place at the Criterion Restaurant on February 26, Mr. Clay, Metropolitan Superintendent, in the chair. The event was a success in every way. The excellent musical programme provided being much appreciated.

The Chairman, in the course of his annual remarks, spoke in high terms of the manner in which the duties of the staff had been performed during the last year, and particularly referred to the excellent work done and the untiring energy of the Metropolitan and Head Office staffs on the occasion of the unfortunate fires at the Company's London Wall and Bank Exchanges.

Perhaps of the subjects touched upon, the one of most general interest was the suggestion of a benevolent fund, to be controlled by the staff. It was pointed out that doubtless members of the staff come in contact with cases of distress that under ordinary circumstances do not come to the knowledge of the higher officials. In many instances these cases would be more satisfactorily dealt with by members of the staff who are in a position to judge of the actual circumstances. The ever increasing Metropolitan staff now numbered over 4,000, and a subscription of 1*d.* per month, an amount which would not be missed by anyone, would produce over £200 per annum.

No doubt readers of the JOURNAL will have something to say on this subject in the next issue.

In closing, the Chairman referred to the fact that London had lost during the past year, by promotion, Mr. Dalzell and Mr. Morten, but had gained Mr. Bailey.

A toast to the chairman which was enthusiastically received, was proposed by Mr. Bailey. He stated that he was precluded from making a speech, but it was eighteen years since he had the pleasure of proposing a similar toast, and he was quite sure that the whole of those present, not forgetting those gentlemen who were no longer members of the Company's staff, and to whom, he presumed, he was entitled to refer as "old boys," would join in drinking heartily the health of the chairman, which he sincerely hoped would be better than it had been during the previous year.

Brighton.—On March 19 a lecture was given to the Brighton Telephone Society by Mr. F. W. Roberts, Local Manager, on "The Properties of Telephone Lines." A discussion followed, on Pupin's method of "Loading." Mr. F. W. Taylor, District Manager, presided. This society numbers 75 members and holds regular meetings for lectures once a month, with many special meetings in the intervals.

Liverpool.—The annual staff dinner of the Liverpool and Birkenhead districts took place at the Bear's Paw Restaurant, on Saturday, March 17, with an attendance of about 200 ladies and gentlemen. The chair was taken by the District Manager, Mr. E. J. Hidden, who was supported by several ladies and gentlemen from the outside districts. An excellent musical programme was provided by members of the staff, and was much enjoyed, especially the Irish items in honour of St. Patrick's Day. Among the volunteer artistes were Mrs. Douglas, Miss Evans, Miss Kidd, Miss Davey, Mr. Douglas, Mr. Roberts, Mr. R. Green, Mr. T. Green, Mr. Fielding, Mr. Ben Adams, Mr. Coffey, Mr. Rooney, Mr. Burstall, Mr. Malley, Mr. Clark, Mr. Harding.

The tenth paper of the Liverpool Telephone Society was read on the 8th inst. by Mr. J. H. Swain on "Operating Matters." Mr. Prout, (Assistant Superintendent, N.W. province) in the chair.

Blackburn.—The Telephone Society held the sixth meeting of the session on Friday, March 9. Mr. Remington presided over a large attendance which gathered to hear Mr. Chambers, Chief Inspector, Burnley, read a paper on "Some Conditions Necessary for Efficient Telephony." The subject was treated in a clear and concise manner, and was effectively backed up by several diagrams. A most animated discussion followed.

This society has a membership of 66, and is now in its second year. Nearly half of the members travel from other parts of the district, such as Burnley, Nelson, Accrington, Darwen, Great Harwood, Chorley, and Clitheroe, to the meeting place in Blackburn, and it speaks well for the interest it has created when it is stated the average attendance is 72 per cent. of the membership.

The subscription is only 2*d.* per week during the session, and the travelling expenses of the members from the various centres are met out of the funds of the society.

Owing to lack of accommodation on the Company's premises the meetings are held in a room hired for the occasion.

Birmingham.—The last of a delightful series of social functions took place on Friday, March 9, viz., a progressive whist drive, at which about 160 of the staff and their friends were present. A pleasing event of the evening was a presentation of a silver card-case from the members of the staff to Mr. J. S. Rhodes, the Organiser, as a token of their appreciation of his efforts. The presentation was made by Mr. R. U. Tucker, the Chief Clerk.

Sheffield Electrical Society.—An interesting paper on "Telephonic Transmission and the Design of Circuits, as applied to Present Day Practice" was given on Wednesday evening, March 14, 1906, by Mr. F. G. C. Baldwin, A.I.E.E.

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STUDY OF TELEPHONIC SPEECH TRANSMISSION.

Paper read before the Liverpool Telephone Society, February 8, 1906, by B. S. COHEN.

TRANSMISSION is a subject which has only been developed on strictly scientific lines during the past few years. That a thorough study of transmission is of very great importance is, I think, generally conceded. A few figures, however, may be given to emphasise its value.

The National Telephone Company have about 560,000 miles of cable line and 166,000 miles of open wire line laid in the United Kingdom. The copper in these lines amounts to about 19,000 tons, worth at the present rates about £1,501,000 for copper alone.

In a mile length of 400 pair cable, if the copper weight can be reduced from 20-lb. conductors down to 10-lb. by a proper study of the conditions, a saving in copper alone of £276 can be at once obtained, besides other big savings in duct space and handling. Now the introduction of 10-lb. cable has been due to the studies made in transmission.

The Company have equipped a laboratory, and made many investigations on the subject of transmission during the past two years, and it is proposed to give in this paper a short *resumé* of some of the more important work done and the methods employed.

Although a knowledge of the fundamental laws which govern telephone transmission is becoming fairly widespread, yet it may be advisable to start with a rapid review of these laws.

It is impossible to compress into this short paper much about the theory of action of the various electrical conditions of a telephone line on the transmission efficiency, so that a few plain statements must suffice.

Firstly.—*Capacity and resistance, distributed as they are in a telephone line, act harmfully on transmission; both tend to increase the attenuation, and capacity, besides, distorts the speech waves by attenuating and displacing unequally the waves of different frequency.*

Fig. 1*a* shows a compound wave, consisting of a fundamental of 800, and the third harmonic of 2,400 superimposed. The action of a length of fifteen miles of 20-lb. standard cable on this wave is shown.

The cable possesses capacity and resistance, and the attenuation is very marked (from 100 per cent. down to about 20 per cent.). The distortion is also very considerable. At fifteen miles the harmonic is practically wiped out.

Distributed inductance in combination with capacity and resistance acts beneficially in both decreasing the attenuation and the distortion.

Fig. 1*b* shows the same wave and the same cable as in Fig. 1*a*, but distributed inductance amounting to ·2 henry per mile has been added.

Distortion has been practically annulled, and the attenuation greatly decreased. The amplitude at fifteen miles being now 71 per cent. of the commencing amplitude, that is, the transmission is now roughly 4·7 times as good.

In Fig. 1*a* it will be noticed that the third harmonic is practically wiped out at fifteen miles. It may be as well to mention that the transmission on fifteen miles of 20-lb. cable is very loud and articulate. In fact the practical limit is not reached until about 46 miles of this type of cable is in circuit.

The probable explanation of this is that the upper harmonics of waves above 800 ~ do not play a very important part in articulation, and, indeed, 800 is taken generally as the upper limit of frequency which matters in speech waves.

Note.—Fig. 1*b* is merely used as an illustration of the beneficial action of distributed inductance, and must not be taken as advocating the loading of a fifteen-mile length of 20-lb. cable. It is quite possible that it would not pay to do this in practice.

Leakage.—With regard to leakage, it must be pointed out that low insulation resistance has a very detrimental effect on the transmission with heavy gauges of open wires, and the old statements regarding leaking lines talking better than high insulation ones must not be accepted without certain reservations.

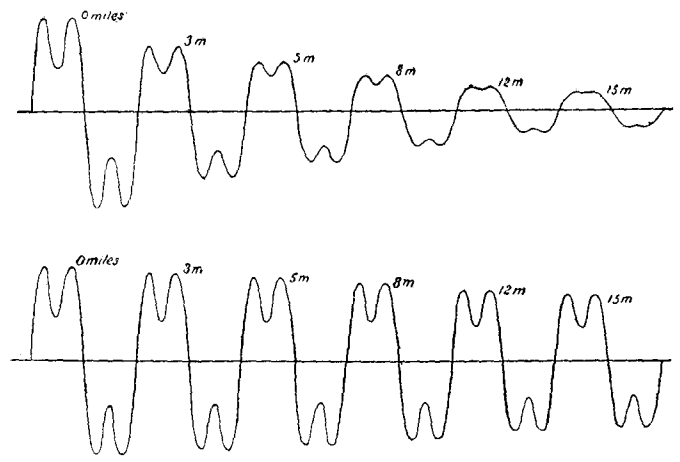

FIG 1.

There is no doubt that the transmission under certain conditions will be more articulate with a leaking line at the expense of volume, but for the types and average lengths of lines met with under practical conditions, the distortion, and, therefore, the articulation, is, generally speaking, of quite secondary importance, and, consequently, everything depends on volume.

There are quite a large number of points, such as the actions of reflection and dissipation, and some little studied phenomena, which take place in the dielectric, such as absorption and dielectric hysteresis, which demand careful attention, but the mere mention of them must suffice here. Anyway, we have to bear in mind that the capacity and resistance must be kept to a minimum and the inductance to a maximum, within certain limits, to get both clear and loud transmission, at the same time considering, from the practical standpoint, the increase in cost due to the reduction in capacity and resistance.

The laws which govern the action of resistance, capacity, &c., on the transmission are now pretty well known, and it is quite possible to easily and accurately work out the percentage volume of current at the far end of a telephone line of any type of non-magnetic conductor, provided no reflection troubles exist to complicate matters.

Transmission Formulæ.—It must be remembered that cable lines, up to and including 40-lb. conductors, have practically negligible

inductances, and, if in good condition, negligible leakances. The attenuation constant for such a line is obtained from the formulæ:

$$\beta = \sqrt{\tfrac{1}{2} p K R},$$

where $p = 2\pi n$ = about 5,000,
K = capacity in farads per mile (mutual),
R = resistance in ohms per mile,
N = frequency

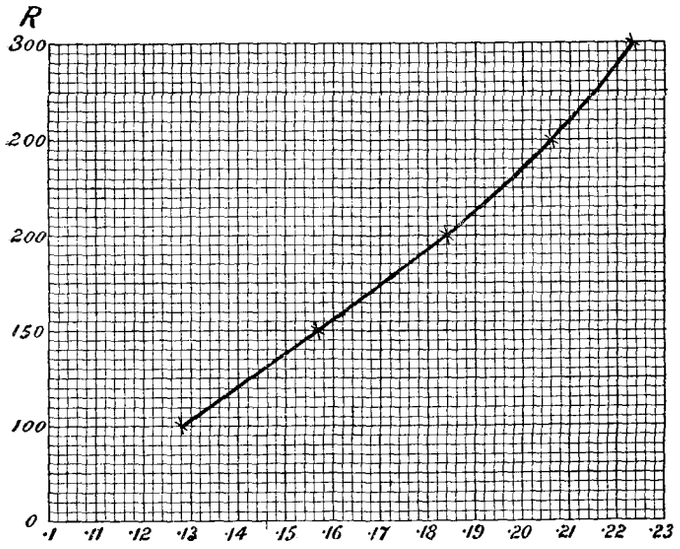

FIG. 2.—Curve showing variation in attenuation constant by varying the resistance of the conductor in a light gauge cable where K = ·07 microfarad and the inductance negligible.

When inductance or leakance are present, the formula becomes somewhat more complex:

$$\beta = \sqrt{\tfrac{1}{2}\sqrt{(R^2 + p^2 L^2)(S^2 + p^2 K^2)} + \tfrac{1}{2}(R S - p^2 L K)}$$

here L is the inductance in henries per mile (mutual), and S is the leakance, *i.e.*, $\frac{1}{\text{insulation resistance}}$.

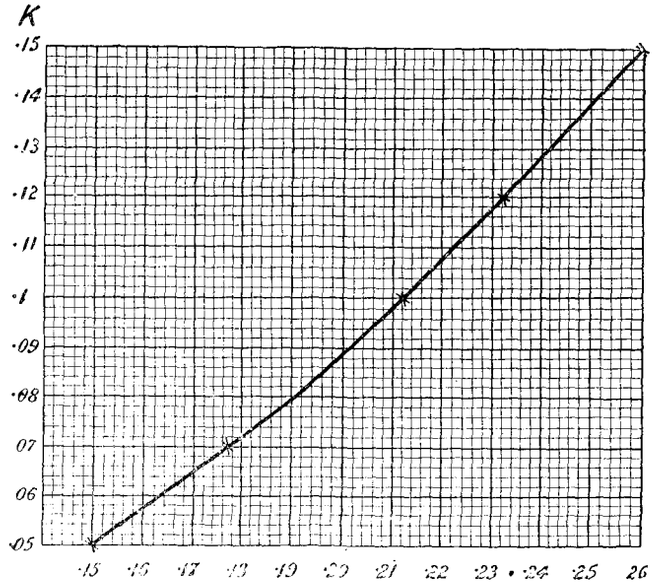

FIG. 3.—Curve showing variation in attenuation constant by varying the capacity in a light gauge cable where R = 190 ohms and the inductance negligible.

From the attenuation constant, the actual diminution in volume and the line equivalent can be calculated. Tables of equivalents for various types of open and cable wires have been published in circular letters and the correspondence classes. These have all been verified, both theoretically and by actual experiment.

These equivalents are the ratios of the attenuation constants of the line considered and the standard, thus the attenuation constant for the standard cable = ·103, and for 100-lb. copper = ·0122, so that equivalent = $\frac{\cdot 103}{\cdot 0122} = 8{\cdot}45$, that is 8·45 miles of 100-lb. copper = one mile of 20-lb. cable.

The relationship between the current at the beginning and end of a line is determined from the attenuation constant by means of the following formula:—

$$C_x = C_o e^{-\beta x}$$

where C_x = the current at the end of x miles of line,
C_o = the current at the beginning of the line (for relative purposes, this can be taken as 100),
e = the base of Naperian logs. = 2·71828,
and β = attenuation constant.

For example:—With an initial current of 100, the current at the end of a 46-mile line of 20-lb. cable = ·91. Although under 1 per cent. of the current has reached the far end of this line, the transmission is still commercial, although close to the breakdown point.

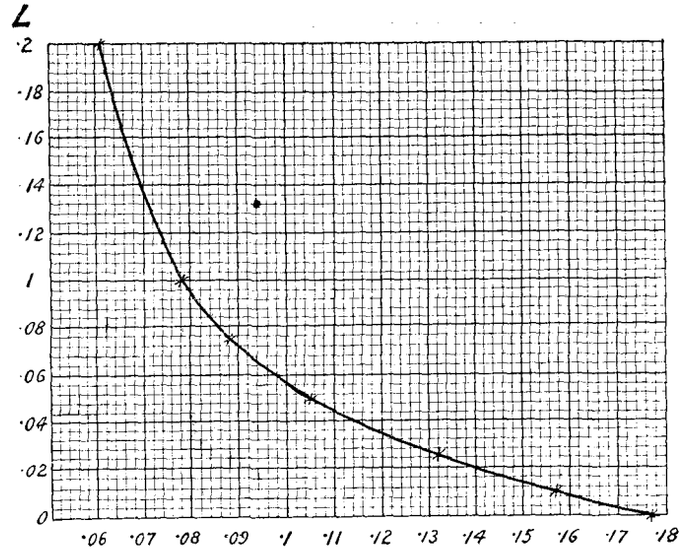

FIG. 4.—Curve showing the variation in attenuation constant by varying the inductance in a light gauge cable where R = 190 ohms, K = ·07 microfarad.

The following is a simple method of obtaining the equivalent direct from the electrical constants for any gauge of cable wire in present type telephone cables (where inductance and leakance may be neglected) up to 40-lb. weight:—

$$\text{Equivalent} = \frac{2{\cdot}18}{\sqrt{K R}}.$$

K = capacity in microfarads per mile loop.
R = resistance in ohms per mile loop

Thus a cable with 84 ohms per mile resistance and ·05 microfarads per mile capacity will have an equivalent = $\frac{2{\cdot}18}{\sqrt{\cdot 05 \times 84}} = 1{\cdot}065$.

It will be of interest to consider the relative effects of variation in any one of the electrical constants on the attenuation, and the ensuing series of curves were constructed to illustrate this as far as a light-gauge cable is concerned.

Fig. 2 shows the effect of varying the resistance from 100 to 300 ohms. This curve at once shows the great importance of resistance as a factor in the attenuation, which is almost directly proportional to the resistance.

Fig. 3 shows the effects of varying the capacity between ·05 and ·15 microfarad. Here, again, there is almost direct proportionality.

Fig. 4 shows the effects of varying the inductance from 0 to ·2 henry. It will be seen that up to about ·08 henry the attenuation is approximately inversely proportional to the inductance, but that from ·08 henry upwards the decrease in attenuation by increasing the inductance is not nearly so marked.

Lastly, Fig. 5 shows the relation between attenuation and leakage. Increasing the insulation resistance above 100,000 ohms does no good in this case, and a drop to 10,000 ohms is inappreciable. A turning point is almost reached, however, at 10,000 ohms, and anything below this gives very considerable attenuation.

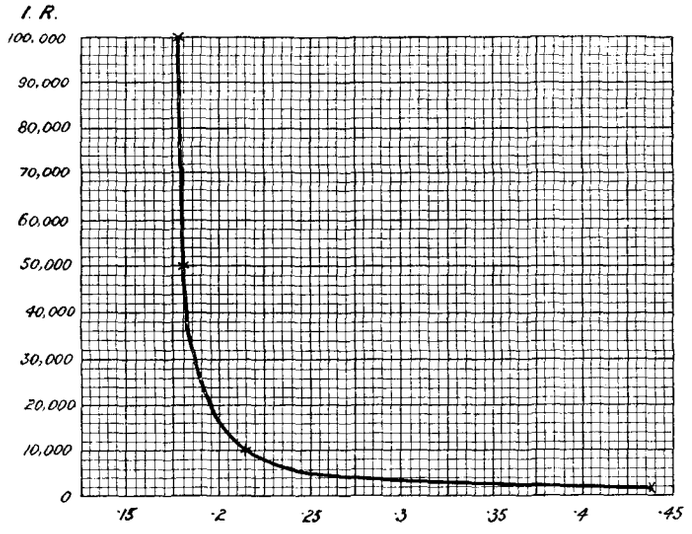

FIG. 5.—Curve showing the variation in attenuation constant by varying the insulation resistance of a light gauge cable where R = 190 ohms and K = ·07 microfarad.

The K R Law.—Before leaving this part of the subject I should like to mention that the K R law, which states that the transmission efficiency depends entirely on the product of K and R, fails altogether when applied to the practical test.

As an example, it has been stated that the limiting distance of speech with open copper wires is given by a K R of 15,000, and that 10,000 must be taken as an easy and practical condition. Now there are many working lines which greatly exceed this, for example, the Boston-Omaha open wire toll line has a K R of something like 69,000, and the transmission is quite commercial.

(*To be continued.*)

EXTRACT FROM 43RD ANNUAL REPORT OF CHIEF OF DUBLIN FIRE BRIGADE.

ALL the fire stations have direct telephone communication with the central station, and the department is connected by duplicate lines with the Telephone Company's Exchange, where attendants are on duty all night, so that alarms of fire or ambulance calls may be sent direct at any time. No number required. Ask for "fire brigade."

During the year the service was maintained in a satisfactory manner. One hundred and sixty-eight alarms of fire and 1,470 ambulance calls were received through the Telephone Company's Exchange, and eighteen alarms and ten ambulance calls from the street fire alarm boxes. These alarm points have worked satisfactorily, and will be extended on the south side of the city during the coming year.

As usual, a great number of messages relating to the public thoroughfares, &c., have passed through our stations, and were transmitted to the proper departments for attention.

PROPOSED PROVIDENT CLUB FOR LONDON.

AT a meeting of the Metropolitan District Provident Club, held at Marshalsea Road on March 12, it was proposed and unanimously carried that a meeting be convened at Salisbury House, Great Hall, on April 26, at 6.30 p.m., to discuss the advisability of promoting a benevolent club for the benefit of the staff of both sexes, to be conducted entirely by themselves, the subscription to be about 1*d.* per month. It is considered that such a scheme would be an advantage under exceptional circumstances which members might possibly experience, and it is hoped that hearty support of the movement will be forthcoming.

TELEPHONY IN THE ISLE OF MAN.

BY G. GILLMORE, *District Manager.*

IN trying to give a description of our telephone system in the Isle of Man, perhaps I shall be excused for first giving a short description of the island, its position, ancient customs, &c.

The island is situated about the centre of the Irish Sea, 80 miles from Liverpool, about 25 from Whitehaven on the Cumberland coast, and about the same distance from the Mull of Galloway in Scotland.

In clear weather the English, Irish, Scotch, and Welsh coasts can be clearly seen from any of the Manx mountains. The island is about 35 miles long by 11½ broad. The coast is mostly bold and rocky, and is composed of various sorts of stone, principally limestone; it will be news to many that the steps of St. Paul's are Manx limestone.

The principal and, I am sorry to say, almost only trade is a rather short visiting season, although there is a fair amount of farming and fishing, and a little lead mining. Last season we landed 412,782 visitors, mostly from the manufacturing districts. The resident population of the island is 55,608.

In the season we have a splendid service of passenger steamers from Liverpool, Fleetwood, Barrow, and Heysham. The Midland Railway Company's turbine steamers from Heysham are equipped with wireless telegraph apparatus. Shall we ever get wireless telephony? I have hopes of it for certain uses, and I think the field for electrical research is unbounded.

To return to our steamers—I say it with pardonable pride—we have during the season some of the finest and fastest Channel steamers afloat.

We enjoy Home Rule, and make our own laws, having a miniature House of Commons and Lords of our own, but we call them the House of Keys and the Council. There is also a Manx language, which is something like the Gaelic, though this is very little spoken.

The far-famed Manx cats have no tails, but our Hall Caine can supply tales to any extent.

We have some very queer old laws; there is one on the Statute Book still, which says that "all Scotchmen landing on the island must be sent back by the next boat." This, I may say, is not now done, as many of our leading men are Scotsmen. The origin of this old law was that at one time there was very bitter feeling between the Manx and Scots, for the Scottish coast being so near the island the Scotsmen used to land and steal the Manx cattle.

Another curious law compels us to keep on good terms with our wives, for though a Manxman can buy as much real estate as he likes, he cannot sell or mortgage any part thereof without his wife signs the deed.

To come to the point as describing the Company's system in the island. In the first place we have no trunks to the mainland. The Government have a three-wire telegraph cable which runs from the north of the island to St. Bee's Head, near Whitehaven, and there joins the main telegraph lines to Liverpool, Manchester, &c.

When I came to the island, some 25 years ago, the Manx people knew nothing about telephones or telephone exchanges. From the business being done in Douglas (the principal town) I saw that an exchange system was needed. I applied to the Government, and succeeded in obtaining one of the few old licenses which covered the whole of the British Isles. I then tried to get the natives to sign agreements to take telephones, but could not get a single one to do so, and at the finish I had to set up a number of free lines to educate the people into the thing. I succeeded in doing this after two years' hard work, and was getting on nicely, when my telephone instruments (which I had purchased from the New Telephone Company) were seized and confiscated through some patent action. I had then to arrange with the old Lancashire & Cheshire Telephone Company to hire me some telephones, which carried me over till the patents ran out, when I was able to buy in open market again.

Soon after this I was taken over by the National Telephone Company. At the transfer I had about 100 subscribers in and around Douglas on single wire earth circuits, since when we have extended

junction lines to all the out towns in the island, of course on the metallic circuit system.

Our most interesting junction line is the one that connects Douglas with Ramsey. This goes over the mountains and rises 1,700 feet above sea level at its highest point, which is just below our highest mountain, "Snaefell," over 2,000 feet above sea level. The wind on this high point in winter is something to be remembered, as there is no shelter. I remember one fearful storm which made great havoc for us. I was taking some stores out to the men in a trap. When we got to a place called the "Windy Corner" the wind blew the trap right over; we had eventually to send the trap back and carry the stores through the snow and wind as best we could.

During thunderstorms we get very heavy discharges from this line, and I need not say that we take care to have extra good lightning protectors. The noise made in the receivers when these heavy storms pass over the mountains is something like the noise made by a shower of hail on a galvanised iron roof, and is so bad sometimes as to stop conversation. This, I am glad to say, does not often happen.

With the sea all round us our wires suffer a good bit from the action of the salt spray, which corrodes all joints, binders, and other places where it can settle. We find it best to paint all these with Siderosthen paint, as it keeps the wet out. I find it is also a good plan to paint with Siderosthen all our stay-wire before erection.

Our switchboards are the usual hand-restoring indicator pattern, with magneto ringing and clearing.

The junction circuits consist of a pair of metallic circuits to each outside town. Out of each of these pairs I get a superimposed or third circuit, which gives me three circuits to each outside place, and as my circuits are all less than twenty miles long I get very good speaking. As we get very little noise on our earth circuits I have succeeded in getting four separate and distinct circuits on one section from two pairs of junction circuits, viz., first, the two original metallic circuits, then the superimposed circuit, then by using three-point balanced coils across all four wires I get an earth return circuit. They all work well without any cross-talk. I fear, however, there will be cross talk from the Editors if I go on with this long jumbled-up article. I will, therefore, close with all good wishes to the JOURNAL, and I hope all who have information to give or want information will make use of it, for, to my mind, it is by such an exchange of ideas that the great help of the JOURNAL will be found.

The present number of stations in the island is 688, of which 502 are in Douglas.

TELEPHONE ENGINEERING.

BY J. J. CARTY.

(*Concluded.*)

WHILE engineers were endeavouring to plan systems in accordance with the flat-rate method, difficulties were encountered at every hand. As soon as the message-rate system was adopted all of these difficulties disappeared, and many positive advantages, not even suspected as residing in the message-rate plan, developed. Under the flat-rate system there was every temptation for the subscriber to send as many calls as possible over one line. This, as I have already stated, resulted in overcrowding the line and was attended by bad reactions of every kind. Those having but small use for a telephone could not afford to pay the high flat rate which that method of working made it necessary for the telephone company to charge. The consequence of this was that only those having a large number of calls installed a telephone, and those having small use of the telephone made it a practice to use the telephones of their neighbours or did not employ the telephone at all. This practice on the part of the small user was a natural one in view of the fact that under the flat rate the telephone subscriber considered that it cost him nothing to allow his neighbour to use his telephone. All of this resulted in a system largely composed of overloaded lines. Under the conditions obtaining in our large cities the relief of an overloaded line can be obtained only at the expense of a second line, which in most cases meant doubling the cost of the telephone service. For this and many other reasons the desired relief could not be obtained under the flat-rate system.

By introducing into the large cities the message-rate system, and by placing proper limits on the load which should be carried upon one line, and by providing a graduated system whereby additional lines could be obtained on a basis proportionate to the amount of their use, relief from this overloading was afforded. More than this, under the message-rate system it is obviously for the interest of the telephone company to encourage the use of the telephone in every manner. For this reason it became feasible and desirable to install as many auxiliary instruments as possible. This was accomplished by providing for those who required two or more lines a switchboard located at the subscribers' premises, this switchboard being so constructed that as many local stations as might be required could be installed at a moderate equipment charge. Each one of these stations is so equipped that it may be connected with a trunk line to the central office, or it may be connected to any of the other local stations without communicating with the central office. In this way not only was the central office substantially changed, but a very important advantage was obtained. Talking between local stations at a local or private branch exchange switchboard could be accomplished without any message charge, and constituted an important by-product costing the subscriber practically nothing. This development not only reacted upon the central office engineering and the general engineering of the plant, but also completely changed the state of affairs with reference to internal telephones, practically limiting the former internal system to special and peculiar conditions.

Considering these two examples of the method of charging which shall be followed upon toll lines and the method of charging which shall be adopted upon subscribers' lines, it will be seen that they in a most extraordinary manner affect the work of the telephone engineer. So profoundly do such considerations affect the proper engineering of the telephone plant that it must be said that good telephone engineering cannot exist side by side with a bad system of rates or with improper business methods and organisation. Nothing more forcible than these examples needs to be mentioned in order to show the intimate relations between telephone engineering and business management.

From time to time, engineering methods involving new principles are brought forth. These, when found to affect the methods of the business office, should be submitted to the business management with a full and clear statement of their bearings upon the commercial work of the company. On the other hand there are, from time to time, business proposals and commercial methods which are under consideration by the business management of telephone companies and which, apparently, are only remotely or not at all related to engineering. In view of the many unexpected and important reactions which these proposals may have upon the engineering of the telephone plant, it becomes of the first importance that they should be scrutinised carefully from an engineering point of view, unless it is conclusively apparent that they will be without effect upon the engineers' plans.

Many other instances besides those which I have enumerated might be adduced, such as the effect of the three-minute toll period method of charging upon the various features of suburban trunking methods; and the complicated and disastrous reactions produced by the introduction of many of the party-line systems.

Thus far I have dealt with some of the more general methods of telephone engineering, indicating briefly their nature. One of the very important features of telephone engineering consists in the design and construction of the varied machinery constituting the modern telephone central office apparatus. A brief statement, therefore, indicating the character of the work which devolves upon the telephone engineer in connection with central office design is pertinent.

During the ten years just passed, a revolution has taken place in the design and construction of telephone switchboards, the magneto switchboard, so called, having given way to the common battery switchboard. This radical change in telephone practice made new demands upon the telephone engineer, for it became necessary for him to introduce into central office construction certain elements which had theretofore been utilised principally in engineering work involving electric light and power installations.

In the magneto system signalling from the subscribers' station to the central office was accomplished by means of a small alternating current generator turned by hand, and the current supply needed in the working of the transmitter was obtained from a few cells of primary battery located at the subscribers' station. By the introduction of the common battery system all of this was changed. The magneto generator was dispensed with, as was the primary battery, the current supply for operating the transmitter, as well as that required to enable the subscriber to signal, being drawn from a large storage battery located at the central office.

In the case of a 10,000-line switchboard the storage battery must be capable of giving an average discharge of 500 amperes, and to ensure proper working conditions it must be capable of giving a safe discharge as high as 2,000 amperes. For charging such a battery as this suitable machines must be employed, and these must be present in duplicate or triplicate. The standard machine used for charging a battery of this type delivers 1,000 amperes.

The introduction of currents such as these, and the introduction of these machines and of a large number of auxiliary machines generating currents for special purposes, has resulted in the creation of a power plant at each central office, upon which the operation of the telephone switchboard and apparatus is wholly dependent. The introduction of these larger currents has necessitated most careful and refined methods of fusing and protecting the delicate telephone apparatus. These protective methods, while following the general principles of such methods in electric light and power practice, are vastly more refined in their working, and call for a hitherto unattained degree of precision in the manufacture of such apparatus.

While the storage batteries and auxiliary machinery employed in telephone power plants are far from equalling the magnitude of similar apparatus employed in electric light and power stations, nevertheless they have become such a vital element of the successful engineering of a telephone central office that they require on the part of the telephone engineer a special knowledge of this branch of electrical engineering, which was formerly not requisite. This class of apparatus must also be considered by the telephone engineer in a special manner, for not only must it be properly constructed from the electric light and power point of view, but peculiar conditions must be provided for on account of the association of this apparatus with such a delicate instrument as the telephone.

Where a dynamo is to be constructed to operate incandescent lamps, let us say, certain minute fluctuations in the potential of the machine are permissible. Were such a machine, however, to be used in connection with telephone circuits, these fluctuations in potential would be sufficient to produce such constant humming in the telephone as to render it inoperative. Hence a greater refinement of the construction of these machines in this respect is imperative where they are employed in the telephone power plant.

So it is with the storage battery, where a number of telephones are supplied by current from one storage battery; even almost infinitesimal changes in the voltage of the battery might be propagated to the telephone lines connected therewith and produce disturbances. For this reason storage battery practice from the telephone point of view presents problems which are different from those encountered elsewhere.

One of the interesting and important developments in the modern common battery switchboards is the extensive use which has been made of incandescent lamps in signalling. Hundreds of thousands of these lamps are now used for telephone signalling, and the requirements of the telephone art have called for special refinement in the design and manufacture of these lamps.

While the common battery switchboards as now used in all of the large central offices represent a revolution in methods, as compared with the magneto system, there are certain elements formerly used in the magneto system which have persisted. Among these is the multiple-board principle. This principle, as is well known, consists in extending the lines to a number of different points in the switchboard so that it is possible to connect with them at any one of these points. The multiple system is opposed to the transfer system, which is one wherein the lines are not so extended or multipled to different points, but proceed directly to a special location from which trunk lines extend to other parts of the switchboard, so as to provide for making the necessary connections. It is safe to say that during the past twenty years there has been no question of switchboard design that has been the occasion of so much discussion and controversy as that pertaining to the extent to which the multiple principle should be adopted. It is interesting to note, therefore, that no type of switchboard of any magnitude is now seriously considered which does not in a very substantial manner utilise this multiple principle.

In a self-contained central office, with relatively few trunk lines extending to other offices, it is found most economical to multiple all of the subscribers' lines to each section of switchboard. In very large cities, where a number of central offices are required and where the amount of trunking between the different central offices is relatively large, the advantage of multipling all of the subscribers' lines to each section is not so apparent as in the case of the self-contained office, and this fact has led many to the conclusion that for such situations multiple boards are not adapted. But this is going farther than the facts warrant, for while it is true that the advantage of multipling the subscribers' lines to all of the sections of the switchboard becomes less and less as the percentage of trunking increases, it is still a fact that the point is never reached where the multiple principle should be abandoned entirely.

The truth of this proposition may be easily established by assuming that in a large city all of the calls must be trunked, and that none of them is local to the office in which they originate. In such a case as this it is obvious that nothing could be gained by extending all of the subscribers' lines before each of the operators. On the other hand, it is still essential that the outgoing trunk lines should be extended, or multipled, before all the subscribers' operators, and all of the subscribers' lines should be multipled before the trunk operators. While the case of an office without any local calls is one which could not occur in practice, there are situations in which the amount of local calls is so small that it will not pay to multiple the subscribers' lines to all of the subscribers' operators. Just when this point is reached is a question to be determined in each case.

Thus far the instances where it has been found possible to omit this multipling of the subscribers' lines are few, but as time goes on the number of these cases must increase; but at no time, so far as can now be seen, will the point be reached where the multiple principle itself will be abandoned. Even in the automatic switchboards, which constitute one of the most interesting of the recent developments, the multiple principle is found to be essential to the working of all types of automatic boards thus far proposed, wherever the switchboard is of any magnitude.

With reference to this matter of automatic telephone switchboards I may say that such types of apparatus have, during the past few years, become a matter of great interest and the subject of much discussion among telephone engineers, and as I have made a number of special investigations into this subject I think it would be of interest if I here briefly state some of the results which I have obtained.

Upon a first view of the case the idea of using automatic machines and thus doing away with the labour of telephone operators appeals with much force, and the wonderful things which have been accomplished by American labour-saving inventions naturally come to mind. Among all of these projects for saving labour by automatic machines none seems more wonderful than the little machine which, when manipulated by the subscriber, will put him into communication with anyone out of thousands or tens of thousands of people scattered over a wide area. But in order that an automatic telephone switchboard should be properly called a labour-saving machine it must accomplish its work at an expense entailing less annual charges than would be required by the system which it attempts to displace. If it should be found that the annual charges of operating the automatic system were equal to or greater than the annual charges of operating the manual system then the automatic system would not be a labour-saving one, and, considered from the standpoint of costs, would be a failure. Whatever merit it would have, in that event, must be looked for in some very superior results in the way of service. From this point of view I have considered the merits of the various automatic switchboard systems which have thus far been installed.

I find that, taking into account all of the factors involved, which go to make up the total annual charges which could properly

be placed against the automatic switchboard system, on the one hand, and the manual system on the other hand, leaving out of account switchboards suitable for use only in small villages, and making comparison up to switchboards of 10,000 lines capacity, that the annual charges upon the automatic system are substantially greater than the annual charges upon a manual system operated on the common battery multiple plan. From the standpoint of costs, therefore, the automatic system fails when placed in competition with the common battery multiple-board operated manually.

Having found that the automatic system could not successfully compete with the manual system in point of costs and annual charges, I made a careful investigation to determine whether the automatic system possessed any advantages of working over the manual system which might compensate for the extra annual charges which its use necessitates. For this purpose there were made about 7,500 service tests on manual switchboards and automatic switchboards operating under practical conditions in different parts of the country. The results of these tests showed that the manual system possessed a most substantial greater degree of reliability than the automatic system. The difference in speed of connection between the two systems was so small as not to constitute a practical factor, the time elapsing between the start of the call and the answer of the called subscriber being in the case of the automatic system 19·9 seconds, and in the case of the manual system 21·7 seconds. These figures include the time taken by the subscriber to answer, and even this small difference of time was found to be due to the fact that the subscribers whose lines were tested answered somewhat quicker in the automatic system than in the manual system. It will be seen, therefore, from these tests that the automatic system possesses no practical service advantages over the manual system, and that it contains no elements sufficient to warrant any part of the extra cost which its use involves. A full consideration of the details of the comparison of these types of switchboards would lead me far beyond the limits assigned to this paper, and would only result in showing that the alleged advantage of doing away with the operators at the central office is imaginary and not real

All of the foregoing relates to switchboard systems smaller than 10,000 lines, no automatic switchboard of larger size having been installed.

In order to determine whether for systems larger than 10,000 lines the automatic principle might be applicable, I made a study assuming a system of 100,000 lines to be equipped with automatic switchboards, and compared this with a similar system equipped with common battery multiple switchboards operated on the manual basis. Here again the comparison is in favour of the manual board, both in point of annual charges and in respect to the service.

In applying the automatic switchboard to this 100,000-line study, it was necessary to leave out of consideration a very large class of difficulties which crop out at every turn when the attempt is made to apply the automatic principle to the complex conditions which obtain in and around all large cities. Inasmuch, however, as the study showed that the automatic system is inferior to the manual system for a 100,000-line plant, it became unnecessary to take into account the large number of adverse factors which must be charged against the automatic plan of working. So important are these factors that it is safe to say that even if the annual charges on the automatic system were substantially less than those on the manual system, they would constitute such a serious objection to the automatic system as to bar its use.

Throughout these investigations the importance of retaining at the central office operators to receive and attend to the subscribers' calls has been emphasised in so many important and unexpected ways that I have no hesitation in saying that no plan thus far employed, which requires that the subscriber should operate a machine and send his call automatically to the central office, can successfully compete with the plan which requires that the subscriber should remove the telephone from the hook and send the call orally to an operator at the central office.

Closely associated and interwoven with the design and construction involved in telephone engineering is the matter of the materials to be used. To the proper choice of material, as well as to their proper arrangement in the plant, the telephone engineer must devote serious and constant attention. All materials which are permitted to form a part of the telephone plant must be carefully studied by the telephone engineer, so as to obtain out of all those possible to use those which offer the best combination of first cost, durability, low annual charges, and high efficiency.

Considering the almost innumerable varieties of materials used, all of which must be covered by standard specifications, the work of this branch of telephone engineering, taken by itself, would require so much time to describe that I will not attempt to enter into it in any detail, except to say that it constitutes one of the important duties of the telephone engineer.

Intimately connected with this matter of the choice of material and making the specifications therefor is the complementary function of accepting or rejecting that which is offered. The drawing up of the specifications must be attended to with the utmost care, so that they may be placed in the hands of the purchasing agent, and be sufficiently intelligible so that any manufacturer or person skilled in the art can understand their purport and supply without further information the articles desired. The drawing of such specifications is of very great importance, for not only must the articles desired be clearly described, but the language used must be such that no material other than that desired can be furnished under the specification. At the same time, while every precaution must be adopted in the specification to exclude undesirable material, great care must be exercised that undue and excessive requirements should not be made. Otherwise the cost of the materials would be unnecessarily increased. Here, as well as at almost every turn in the work of the telephone engineer, there is no safe side. If the specification is made too rigorous, and calls for material of a quality in excess of that which is demanded by the nature of the construction, loss will result. On the other hand, if the specification is drawn loosely or so as to admit inferior material, loss will result, owing to defective working of the construction in which such materials would enter.

So far as I have gone, I have described the more typical functions of the telephone engineer. In addition to this, there are constantly arising questions demanding special investigation. The range of these questions is almost unlimited, and their adequate treatment requires most laborious and serious effort on the part of the telephone engineer. While their range is so extended as to cover almost every field of engineering in scientific progress, and while the telephone engineer cannot be expected to be expert in all departments of scientific investigation, he is required to direct such investigations, employing, as his judgment may dictate, experts in various departments to report upon those phases of the work in regard to which they may be best qualified to speak.

Thus far I have discussed the work of the telephone engineer without particularly calling attention to his relations to the telephone organisation at large. This relation can best be understood by stating that the telephone engineer in every well-organised telephone company must, in the first place, broadly determine all of the important features of the plant of the company, and he must in detail decide what shall be the nature of the construction and the method of operation of every single item which constitutes the physical property of the telephone company. If, through defective design, a telephone cable is found to be ineffective, mechanically or electrically, it may be said, in a properly organised telephone company, that the fault lies with the telephone engineer. If, through defective design, the telephone switchboard is found to be unsuitable with respect to its maintenance or operation, the fault lies with the telephone engineer. So on through all of a multitude of items which constitute a telephone system. If, in a well-organised and well-administered telephone company, the plant is not constructed in accordance with the best state of the art, the fault lies with the telephone engineer.

That this must be so will be made clear by describing the method which obtains in well-organised telephone companies of getting from the board of directors the necessary appropriations for carrying out all construction and reconstruction work. Under such conditions a development study will have been made and will have been approved by the business management. The traffic department will have, from its careful watching of the extent of the available facilities, given due notice at the time at which additions, changes or renewals of switchboard facilities may be required, all of which are presumed to have been contemplated in the broad plans already approved by the business management. The construction

department will have, from its constant watching of the available cable and line facilities, given due notice of such changes, renewals and additions as may be required in these parts of the plant to accommodate the growing business and fit in with the approved general plan. In the case of the traffic department, the demands of the service having been thoroughly studied by that branch and the essential data having been supplied to the engineer, the necessary detail studies, plans, and specifications are prepared by him and an estimate prepared for the work required. A case will be made out setting forth the nature of the work and the necessity therefor, and an estimate showing its cost and a specification describing the work in detail will be submitted to the management, and if in proper form it will be duly approved. The estimate and specification will then be turned over to the proper department and, depending upon the nature of the construction, the work will be executed by the telephone company itself or by a contractor.

The work must be supervised, as far as may be necessary, by the engineer, and upon its completion he must accept it or reject it. Having accepted it and having made a report to that effect to the business management, the transaction is completed. By this acceptance of the work, the engineer assumes full responsibility for its efficiency.

So it is with the cable plant, except in this instance, as a matter of administrative efficiency, the superintendent of construction may submit detailed plans for the extension to the cable and wire plants, following, however, general lines which have already been standardised by the engineer. These plans and specifications having been accepted by the engineer, and the work having been passed through the regular routine, the ultimate responsibility rests in the engineer's office.

So it is with other features of the work. From beginning to end the engineer is thus placed in a position to exercise a veto power upon any adverse methods which might otherwise be allowed to creep in.

The carrying out of this estimate system in this way places final responsibility upon the engineer and recognises in the most practical manner one of his most important functions, which is to co-ordinate the various elements which must be put together in such a manner as to avoid conflict and produce a consistent symmetrical organism, each part of which will be designed and constructed with due reference to the functions which it must perform and also with due regard to the functions and importance of all other elements in the system.

The importance of this co-ordinating function cannot be over estimated, and it is only at some central point that such function can be exercised. Being judged from the maintenance point of view, a piece of apparatus might have qualities of a high order, but when considered with reference to its effect upon the traffic, difficulties might be discovered which would entirely overweigh the maintenance advantages. In such a case the conflicting claims with respect to the apparatus must be considered by the engineer, and his decision must be rendered with a view to producing the best net result.

Again, systems might be proposed which, considered solely from the maintenance, construction, and traffic points of view, might seem to possess all of the advantages of an ideal arrangement, but when considered from the standpoint of the efficiency of transmission might be found to involve an impairment of transmission on one hand or such increase in cable and line costs on the other hand as to render their use out of the question.

In order to exercise proper co-ordinating functions, it is essential that the engineer should be placed and should maintain himself in such relations with all of the departments of the telephone organisation that he may get from them and fairly consider all of the projects and ideas pertaining to the design, operation, construction and maintenance of the plant which naturally originate in such departments when they are conducted with proper efficiency.

Viewed from this standpoint, it will be seen that while the function of the engineer with relation to the plant is of the utmost importance, nevertheless the work of the traffic, maintenance, construction, and other departments has such an important bearing upon the whole system that the successful engineering of a telephone system must be regarded not only as the work of the engineer himself but as the work of all the other departments concerned. Not only this, but what is still more important, the successful engineering of a telephone plant depends upon proper business management, as I have indicated by several striking examples. Without an intelligent progressive and broad-gauge business management there cannot be good telephone engineering.

"ALLO!" "HELLO!" AND "HULLO!"

FROM the *Morning Leader*:—

L'appel téléphonique allô! n'est pas d'origine britannique, bien que nous l'ayons emprunté aux Anglais. *Allô! est de source française et bien française.* Il vient de l'exclamation "au loup!" qui epouvantait les enfants au temps où il y avait encore des loups dans nos forêts.

Et comme il y en avait beaucoup au douzième siècle, lorsque Guillaume le Conquérant devint roi d'Angleterre, les Normands apprirent aux Anglais à crier au loup! cri qu'ils répétèrent en l'estropiant. De au loup! ils ont fait d'abord alloup! puis allô!

Ces déviations de prononciation ne sont pas pour surprendre dans une langue où le nom très français de Beauchamp que porte un comte anglais est prononcé Bitchamme!

Nous avons été plus galants: nous leur avons repris leur allô! sans lui infliger aucune torture.

We do not agree. Is it not inflicting torture on a word to deprive it of its "H?"

Apropos of "Allo!" we observe that certain evening comic papers delight in heading their telephone intelligence with a conspicuous "Hello!" or in alluding to operators as "Hello-girls." Why "Hello!"? No Englishman ever uses the expression, unless he be one of a minority who form their manners on American comic journals. An Englishman always says "Hallo!" or "Hullo!" and it will be found that this is the only expression of the kind current in English literature.

SOME CANVASSING MAXIMS: A SWARM OF BE'S.

Be neat.
Be brief.
Be tactful.
Be pushful.
Be accurate.
Be thorough.
Be courteous.
Be persistent.
Be methodical.
Be enthusiastic.
Be watchful for new openings.
Be agreeable without being unduly familiar.
Be ready with an argument for every occasion.
Be hopeful and never take "No" for an answer.
Be willing to learn all you can about the Company's business.
Be fully posted up in all the rates and the rules and regulations of the Company.
Be convinced that the article you are pushing is the best in the market and splendid value for what you ask for it, and that it is indispensable, and you will convince others.

QUEER FAULTS.

MANY of the readers of the NATIONAL TELEPHONE JOURNAL would, no doubt, be able to give some interesting experiences of strange faults found while in the exercise of their calling as faultfinders. The writer recollects attending a disconnection trouble on the telephone at a grocer's shop. It was in the days of earth circuits, and one of the first things to be examined was the earth wire which I found securely tied to the leg of a table standing in a corner of the shop. On asking the subscriber for an explanation, he informed me that the water-pipe being about to be altered, he had taken the precaution to transfer the wire from the pipe to the table, which, he pointed out, was a substantial piece of furniture!

I wonder if any of your readers have ever encountered a more "wooden" fault.

TELEPHONE COURTESY.

ONE keen business man, says the Philadelphia *Telephone News*, has had the following suggestion printed, framed, and hung above the branch exchange switchboard in his office:—

"In using the telephone remember that a stranger is at the other end. The manner in which you speak to him renders him a customer or the reverse. Make a customer of him and you increase your usefulness to the firm."

By this brief but pointed instruction the necessity of politeness, attention, and patience in telephone communication is impressed upon this firm's employees. Such a notice over every business telephone in Britain would much improve the service.

PRIVATE HOUSE DEVELOPMENT FROM A CONTRACT POINT OF VIEW.

H. JULIUS MACLURE, *Contract Manager, Brighton.*

THERE is an impression among most private residents that the telephone is purely a piece of office or shop furniture, and therefore useless, even a positive objection in a dwelling house. This impression is to some extent due to that slovenly habit of considering the telephone as an *article*, instead of regarding it as part of a *service*, available day and night, weekdays and Sundays, for all sorts of convenient labour and time-saving purposes.

The reasons which induce the business man to become a subscriber hardly apply at all in the case of the private resident, and whereas a more or less cut-and-dried stock of arguments may suffice for the canvasser whose field of operations consists of offices and shops, quite different methods must be observed when a residential district is being attacked.

It is, of course, to be presumed that any man starting upon a private house canvass is fully up in all details of rates, classes of service, business arguments, &c., and, further, is of irreproachable appearance and address. Also, that his day's work has been carefully and scientifically mapped out, while he at least knows the names, if not the calling (if any) of everyone he is going to approach.

The best hours for calls are from 10 a.m. to 1 p.m., 2 to 4.30 p.m., and after 7 p.m., the latter especially, owing to the head of the household being usually at home during the evening.

The fatal error of making house to house calls should be carefully avoided, for the premises visited should be just sufficiently far apart to give the impression that each call is a special one at that particular residence. Hence it may be necessary to work several streets at once, calling, say, at every fifth number—1, 5, 10, 15, and 20 in two or more streets one day, and taking 2, 6, 11, 16, and 21 the next.

The canvasser will find it an excellent plan to arm himself with 20 or 30 plain envelopes (closed) containing his card and some neat and clear leaflet dealing in a few words with the advantages of the service, and quoting the most tempting rates. Then having without any hesitation approached the house to be called at, and the door having been answered, the occupier—or, possibly, his wife—should be asked for by name, care being taken to do nothing further than express a desire to see the person enquired for. The canvasser is best advised to give his own name and to avoid stating the nature of his business to the servant, but at the same time in no way to give offence to the latter, or the chances of a second interview may suffer. Having secured admittance and a hearing by the householder, or his wife, the proper methods of attack may be brought into play. At this point the use of the sealed envelope, already referred to, may be explained. In the event of the person called upon being out, one of these envelopes should be addressed to him and handed to the servant, and a promise extracted that it shall be given to the addressee upon his return. Thus a point is gained by bringing the rates directly to the notice of the future subscriber. Assuming, however, that an interview has been secured at the first call, the canvasser should boldly state that he has been directed by the Company to call at that particular house and explain the great advantages to be secured by having the National telephone service installed there. The direct statement should be made that the results secured will repay the outlay many times over, *i.e.*, by saving money in cab, train, tram, and omnibus fares, postage, telegrams, and messengers, while time, inconvenience, and even temper will also be saved daily, and thus for a small outlay, big returns are steadily secured.

Stress should be laid upon the fact that 95 per cent. of the daily shopping can be done from home, and the positive statement can be made that the servant difficulty fades away in households where the National service is available. In explanation, the canvasser must direct attention to the fact that no more running out for cabs, to post letters, to despatch telegrams or express letters will be necessary; these excursions, which the telephone service saves, are often highly inconvenient both to the mistress and the maid (especially to the latter in wet or cold weather) through important household work having to be interrupted or left entirely. Further, the irritation caused by the grocer omitting the coffee from his delivery—just when, by an accident, the cook forgot to order more until she had used the last—will be a thing of the past, for a call through the telephone will insure the forgotton package being sent at once. Naturally the value of the service, in case of accident, fire, theft, &c., will be expatiated upon, in fact the telephone rental may, under this heading, be regarded as a very cheap insurance premium. Cite the case of a bad scald, burn, or perhaps a gash in the arm due to a broken window, and the facility for instantly calling the family or any other doctor in the immediate neighbourhood.

Suggest that social engagements can be made, postponed, or arranged in less time than it takes to address and dispatch a single note, let alone write it. Point out also the advantage of securing the reply in the one operation. Explain how telegrams and express letters may be dictated to the Post Office and written down there free. Press the advantage of master or mistress being able to call up home with some urgent or forgotten message from any one of the hundreds of call offices within miles round—perhaps from the railway station two minutes before the train starts. Suggest to the male members of the household that with the telephone service at the office and at home, one's wife can be asked if it would be convenient to bring a friend home to dinner or lunch; or the golf club can be called up to make certain of a match. With the service available at home, there will be many a Saturday which can be taken as a holiday, because there happens to be nothing in the morning's letters; and if there were, they could be read through the telephone, and the replies dictated. Show that theatre, concert, and restaurant enquiries and arrangements can be made quickly and with little trouble. Insist that that bane of everyone's life—letter writing—is reduced to a minimum when the telephone is available.

The canvasser must keep his eyes open for hints which will give him an opening; a copy of a sporting or financial paper lying about will give the cue for a reference to racing, cricket, and football results, or stock market fluctuations, and to the convenience of being able to give a word over the telephone to bookmaker or stockbroker.

Express surprise at the person you are calling on not being already on the service. Remind him that no one grudges a few pounds on the rent of a house if it gives facilities for gas and electric light, baths, hot and cold water on each floor, etc., so why not consider the telephone service, now so much used by all classes, as part of the equipment of any house, and be willing to pay for it accordingly?

It may be taken as a fact that good results will be secured upon either very fine or very wet days. In bad weather the canvasser must be suitably clad and use care to avoid taking a dripping coat or umbrella beyond the hall-stand, and must further use means to remove superfluous mud from his boots on entering. On very fine days people are generally in good spirits and persuasion is made easy, while on very wet days your desired future subscriber can afford you plenty of time to talk to him, and that is all you need to secure his order. This, at any rate, applies in the case of a non-professional or non-business man, while in other cases probably an interview will be obtained with the lady of the household. Thus the state of the weather does not enter into private house calling so much as in the case of a business canvass.

The securing of outside information is of more value in a residence canvass than in any other.

That there is illness in the house, that there will be, that a legacy is coming along, that a small fire, an accident, or a burglary, has occurred; that the head of the household is a sportsman, that he or his wife plays golf, that a particular family entertain a great deal, that the householder is frequently away from home owing to being a commercial traveller, a consulting engineer, etc., etc.; these and a hundred and one other points are items of knowledge the canvasser should lay himself out to secure, and then follow up by an interview, using his special piece of information as the means to secure an order. When this has been done, the canvasser should never fail to ask for recommendations to neighbours and friends, and should call on these at once, using the new subscriber's name to secure an interview, and then an order, pointing out to the Browns that as the Jones have signed, of course they—the Browns—must naturally want the service as well.

Watching carefully to see when the line in connection with an order secured has been connected, the canvasser should call within seven days "to see how the service is working," making this the excuse to secure more recommendations to friends.

Be it here noted that it is of much importance in a private house canvass to quote the higher rates. Most business men know something of the telephone service, most private residents know nothing; so that it is a case of quoting for the best classes of service at the outset, as a private resident is probably sure to be able to pay one of the higher rates. It is well to use every effort to clinch matters at the first call, but if more than one is necessary —while using the greatest discretion—probably a three days' interval between calls is sufficient.

It is well to remember that tact is essential in connection with all canvassing, but that cent. per cent. more of that valuable commodity is necessary with residence canvassing than with business or shop canvassing.

Probably one of the greatest difficulties to overcome is obstruction from servants. This is to be got over according to circumstances. Often one succeeds by insisting, firmly but kindly, upon seeing the person asked for, using perhaps a little of what an Irishman would call "blarney"; if all else fails, then explain the value of the telephone service to the servants themselves as a means of saving them work and trouble; also touch upon the convenience of internal extensions, which save running up and down stairs. Perhaps the butler or footman may also take interest in sport!!

When the canvasser does secure an interview let him always remember one practical and important point. It is this—never have a space of less than five feet between yourself and the person you are interviewing. The man who, while talking, gets closer and closer to you is a nuisance, if not positively objectionable, whoever he may be.

Every canvasser should carry with him a book containing the name of every street in his district, and under each street heading should appear the names or numbers of every house in the street. Against each house where there is an existing subscriber a letter "S" should appear, and against each house where there is no existing subscriber the occupier's name and an entry of two or three words as a guide to the state of the canvass at the last call. The cards in the office will give all details, but such notes as "probable," "about March," "after Christmas," "away till June," "call on May 13," "only in after 7," will be found of the greatest assistance. Lastly an "E" should appear against each empty house number. All unoccupied houses should be carefully watched, and a canvasser should never walk through a street in his district without a reference to all the "E" entries to see if there are any signs of letting. If there are the case should be followed up promptly. Enquire of the house agent, the decorators in the house, the neighbours, or the local shopkeepers etc., who is coming in. The name and present address should be secured, and an interview got at once, or if this is impossible the office must be asked to write a letter requesting an appointment and quoting rates.

When a man is taking a new house he frequently does not mind spending a few pounds more, and often the wiring for the telephone can be done prior to occupation or decoration. The best canvasser invariably secures "empty house" business. This has been proved over and over again. He works in with the local tradesmen, finds out which of these have the service (gets those on who are not), and tells them of the new people coming in, suggests their calling to try and get custom by pointing out that they are on the National service. Most up-to-date tradesmen are pleased to hear of new arrivals, and thus gladly work hand-in-hand with the canvasser for the common good.

One private house resident will tell you he has no use for *a telephone*. Answer him that you are suggesting his having the *telephone service*, and tackle him on its utility from the *service* point of view. Another will say it would be a positive nuisance—people would be ringing up all day. Show him at once that a tradesman would have more sense than to call up except when he has been asked to do so. The subscriber's friends would be more considerate, unless there were a proper reason, while strangers would have no cause to do so. Hence he would use the service whenever he wanted it, and only have inward calls which were a convenience to him.

Still another will say he cannot afford the service. Show him how he will save money.

Some persons will tell you they want quiet and rest. Prove to them that the telephone service enables them to isolate themselves and yet, when they wish it, to be in touch with the world night or day. Show them they can tell their friends not to write, call, or telegraph, for as telephone subscribers they can be got on the line in a moment, if sufficient cause arises.

A good plan is to tell everyone, whatever objection is raised, that "that being so" he is the very person who has most needed the service for years, and then prove your words according to circumstances.

If the husband wants the service and the wife opposes it waste no time over the man but win over the woman. If the boot is on the other foot leave the husband to the wife's wiles, for if she wants it he is doomed and you are safe for an order. Remember that any reason is good enough—provided it is a true one—to secure an order for the service and get it installed, for once there it will demonstrate its advantages itself. Thus, one man was bent upon having a lightning conductor on his house, but he took the service (and has kept it) because the instrument was fitted with lightning arresters and the service was cheaper than having a lightning conductor erected. Another, an artist, gave his order because he had a blank space on one of the walls in his hall and he considered a telephone instrument would best fill it. One lady, the secretary of an association, who was from home all day, gave her order so that she would be able, by means of the service, to call up home at odd hours and find that her maid was on the premises attending to business.

These instances are mentioned to illustrate how wide is the field of argument and illustration open to the smart canvasser who is engaged upon private house development.

A note of warning, however, must be sounded against the slightest deviation by the canvasser from the truth. The intending subscriber must never be left labouring under the slightest misapprehension as to what he will be entitled to or liable for, and the really first-class canvasser never secures an order for any service other than that which the subscriber should have in his own interests, regardless of what the subscriber may have thought he wanted. There is no department in the Company's service where rigid truth and accuracy are so absolutely necessary in the Company's interests as the Contract Department. While witty, the following anecdote certainly maligns a properly constituted Contract Department as much as it does the wayleave branch:—

The story goes that a gentleman named Brown once called upon the manager of a Bell Telephone Company in America, and pointed out that he had been a good friend to the Company in many ways, and had never, up to then, asked anything in return. Now he had come to ask something. He wanted a job found for a man he was interested in. The telephone manager expressed his willingness to oblige if possible, and asked Mr. Brown if his *protégé* had any technical knowledge of outside work. "No." "Of inside work?" "No." "Of telephone work at all?" Mr. Brown feared not, in fact he did not think the man had ever seen a telephone instrument, but he added "he is a thorough liar." This at once aroused the interest of the manager, who said, "Ah! Is he one of those liars whom it is impossible to find out?" "Yes," said Brown. "Then," said the Bell representative, "we will make him a contract agent." "Oh," added Mr. Brown, "and if that is any sort of a recommendation, I never met a man who could shift so much beer." "Ah," said the manager, with a sigh, "then we must make him a wayleave officer."

TELEPHONE DEVELOPMENT IN THE SHETLAND ISLANDS.

OF late years a great development in the fishing industry has taken place in the Shetland Islands, so much so that Lerwick is now looked upon as a great fishing centre. With this development has come the necessity for quick communication. Curers find that it is absolutely essential that their yards should be kept in close touch with the sale rings, and for this purpose a movement is on foot to supply them with private wires between their offices and yards. The scheme has been taken up enthusiastically, and before the 1906 season is well begun we should have a system of communication in operation, in what, so far as this Company at any rate is concerned, must be regarded as the *Ultima Thule* of its operations.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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BRANCH EXCHANGE OPERATING.

AN opportunity for considerable improvement in the general efficiency of the service lies in better training of private branch exchange operators and of subscribers' telephone attendants generally. Large users of the telephone service do not, as a rule, appreciate how much the quality of the service they and their clients receive can be raised by thoroughly smart and intelligent handling of the public end of the system. Too often the operating of the branch switchboard in a large office is left to an office boy wholly uninstructed in the proper manner of handling calls and of talking over the telephone. A call through one of these branch exchanges is generally marked by a series of grunts alternating with a series of exasperating silences, and not infrequently ends up with a connection to a wrong department or with a long delay that results in a "cut-off." Business men do not realise how much their clients suffer from this clumsy way of working the service, and it is our duty to show them the nature of the evil and the proper cure for it.

Both the Traffic and the Contract Departments can do much in this direction. Invariably when a new private branch exchange is contracted for or installed the subscriber should be advised of the importance of correct and efficient operating. A trained operator will always give the best results, but if office boys *must* be employed as branch switchboard operators they should be carefully trained in politeness, in smartness, and in proper telephone methods. The answer to a call should be, not "Hallo" or "Are you there!" or some inarticulate grunt, but the name of the concern, as "Telephone Company," "North Western," "Harrod's," "Whiteley's"—then the caller knows at once that he has got to the right place and goes straight on to ask for the person he wants to speak with. If that person is talking at the moment the operator should say "Mr. So-and-so (or such a department, as the case may be) is engaged, please wait a moment"; probably the worst fault of boy branch exchange operators is the practice of making no reply or explanation if the call cannot be put through at once, leaving the caller in the air, so to speak, for perhaps a minute or two. This is one of the most irritating experiences a telephone user can have; it is wholly unnecessary, and it arises simply from careless and ignorant operating of the branch exchange.

The private branch exchange, properly equipped, efficiently operated, and intelligently used, gives the perfection of telephone service to the large concern, and to the customers and clients of that concern. The outward traffic is picked up at the precise spot from which it should originate, and the inward traffic is carried to the precise spot for which it is intended; there is no loss of time in running about to the telephone, in sending to bring people to the telephone, in "holding the line," or in getting someone else to retake the message which the wrong man has received and can do nothing with. The "engaged" trouble is practically abolished, or at least greatly reduced; it can be abolished altogether whenever busy concerns clearly recognise the reciprocal nature of the telephone service, and appreciate that they owe it to their clients and correspondents to give as free access by the telephone doors to their establishments as they give by the more conspicuous street doors. In addition to the acme of exchange service the private branch exchange user gets a valuable by-product in the internal communication between departments. In all large establishments this is an important part of the usefulness of the branch exchange installation.

A large proportion of the benefits to be derived from this class of equipment and service may, however, easily be lost if the equipment be inefficiently worked and the service slackly rendered at the subscriber's end. The careless and slapdash way in which the telephone service is often handled at the subscriber's end of the line sensibly diminishes the general efficiency and effectiveness of the service. If these careless and unintelligent ways are allowed to become rife in private branch exchange operating the evil results are greatly magnified. Traffic and contract men should lose no opportunity to advise subscribers of the importance to themselves and to all subscribers with whom they have dealings of polite, careful, and conscientious operating of their telephone equipment, whether that equipment be a single telephone or a large branch exchange installation.

THE TELEPHONE ENGINEER.

IT is related by an English telephone engineer that on a long railway journey he got into conversation with an intelligent fellow passenger who turned out to be a prominent business man of sufficient wealth and eminence to have earned a title. Curiosity being a characteristic of intelligent business men, the magnate eventually asked what was the profession of his new acquaintance. "I am a telephone engineer," was the modest reply. "*A telephone engineer!*" was the italicised exclamation. "Why, I didn't know there was any engineering in telephones." The poor man might well be excused. The average man in the street thinks of a telephone system only as a bunch of wires attached to a mysterious switchboard placed in a room which is a cross between a girls' school and a jam factory; while even a careful reader might go through all English newspaper telephone news, and through various big blue

books too, and come to the conclusion that the most important features of the telephone question are that there is a £5 13s. 7d. rate in Stockholm, a £2 9s. 11d. rate somewhere in Holland, and that certain politicians and town councillors think, at great length, that "telephones" ought to be "controlled" by the municipalities.

We should like every legislator and every town councillor—especially those belonging to the few town councils which have dabbled in "telephones"—to be a careful reader of Mr. CARTY'S eloquent and inspiring paper, which we conclude in this issue. It is a deep and satisfying draught of telephonic wisdom that Mr. CARTY has given us. It is unhappily most unlikely that anyone outside the telephone world will read it—if they did it would perhaps to some extent open their eyes to the amount of "engineering" that there is in telephone work. In the latter part of his paper, Mr CARTY reverts to the necessity for a close and sympathetic alliance between business policy and engineering policy if sound and enduring results are to be produced in telephone work. The list given of the responsibilities of the telephone engineer is almost an alarming one, at least it would be alarming if telephone engineers did not well understand that they have to be technical Admirable Crichtons.

Perhaps Mr. CARTY'S many illustrations of the close relations between the business and the technical side of telephone work might be summed up in this way: The telephone manager must be a bit of an engineer, must at least be able to appreciate the engineering bearing of what seem like purely business proposals, and the telephone engineer must be a good deal of a business man.

Telephone men can get many good and useful les ons from this clear survey of telephone engineering. The most useful one, the golden thread that runs through the whole paper, is that the telephone man in any branch can never learn too much about all the other branches. The reaction between one part of the work and another, though often far from apparent on the surface, is so constantly exemplified that hardly any telephone problem can be considered as a purely isolated one. The man who works and thinks in a watertight compartment is not on the high road to become a real telephone man.

RESIDENCE DEVELOPMENT.

THE article by Mr. MACLURE contains many useful and practical hints on Contract Department work in residential districts. The importance of high residence development cannot be over-estimated. Not only does such a development greatly increase the general usefulness of the service to the whole public, but it directly raises its value to the large classes of subscribers whose business mainly depends on private house custom. To the Company such development is important because the extensive adoption of the service among private houses influences other business, both directly and indirectly. If a fair proportion of residences are on the service all but the very smallest shops must necessarily take the service also, so as to be in ready touch with their customers. New residence subscribers quickly tell their friends what a convenience they find the telephone service, and suggest to them that they, too, ought to be connected so that all may be in closer touch.

As with the electric light, the telephone service shines nowhere to greater advantage than in the private house. To be able to do a great proportion of the daily shopping without moving from one's own fireside, to be able to communicate instantaneously with friends, and to make easily and quickly the thousand and one other little communications that come up in the course of a year—the daily convenience is so great and so real that a very short experience is required for the housewife to vote the telephone indispensable. At present the vast proportion of people have so little experience in the use of the telephone service that it is necessary to carry on a campaign of education, and so deep-rooted is the prejudice against innovation that even that is none too easy work.

Still, the telephone is gradually taking its place in the English home, and it has been shown in the few places where conditions have allowed of active development that, once fairly started, the use of the service in private houses spreads very rapidly. No believer in the telephone service can doubt that before long it will be considered an indispensable part of the equipment of every private house where a reasonable standard of comfort prevails. Strong support for this belief is afforded by testimony from towns where the residence development is high. It has been observed that the young people take very kindly to the use of the telephone—that they are continually calling each other up to consult about their lessons, their play, and their various little affairs. This shows that a generation of practised telephone users is coming along. As these schoolboys and schoolgirls grow up and have their own establishments they will have those establishments provided with telephone service as a matter of course. Universal use of the telephone is certain in the not distant future.

THE OPERATORS.

IN another column we print a letter from some representatives of the operators in which kind wishes are conveyed - for which we are sincerely grateful - and the suggestion is made that a special page be devoted to matters of particular interest to operators, to be dealt with in terms not too technical. The suggestion has one disadvantage. We are not expert journalists, but we know this much about journalism—that special pages and special departments are one of its great failings. Many readers get to think that they are interested only in one special page or department; they go straight for that and ignore all the rest. We shall publish many pages each month of special interest to operators and of special interest to other branches of the staff; they will find them by reading the JOURNAL straight through and trying to extract something of interest from each article, each paragraph, and each note. Often in this way they will get a reflection from some facet of our great work which will surprise and please them.

It is not our policy to turn the JOURNAL into an A B C Guide, a Who's Who, or a What's What. What we wish most particularly to do, besides directly interesting each department, is to interest *all* departments, to let each see how all must co-operate, and how important that co-operation is, in the production of the results which we accomplish for the great unreasoning public. Our work is variegated in the extreme, and each part of it has its reactions on the other parts. Wayleaves and operating are not so far removed from each other as some might think. Canvassing and operating have the greatest bearing on deep engineering problems; office organisation and handling of supplies are questions that touch everybody at some point or other, sooner or later. No telephone worker can tell when knowledge of some one or other of the

unnumbered details that go to make up telephone service will come in useful—prove directly profitable—to him or her.

Therefore we would say to operators and to all others: Look carefully through the JOURNAL for those articles and notes that bear specially on the work of your department, but do not neglect the others; the title may be unsympathetic, the subject matter may look abstruse, the connection with your own work may seem remote, but in every paragraph you run the chance of finding some thought or fact that will be of interest and may be directly helpful to you.

We would also say this to the operators: You can help to interest yourselves by interesting *us*, and this "us" we mean not editorially, but representing all telephone workers. It is you who deliver the finished product to the consumer, who work our costly switchboards and control our still more costly wires and cables. It is you who, daily and hourly, are in closest touch with the great public whom we serve. Give us your experiences, your ideas and your reflections, and help to make the JOURNAL fulfil its mission of covering fully all phases of our work.

One word we would add for the benefit of all who feel they have something of interest to contribute. Let none feel afraid because of not being a practised writer. The editors will look after the King's English and impart precision, if that be necessary. Few of us have practice in writing for print, but that need not deter any who feel they have useful experience to record or ideas to circulate. And let all also remember that one thing we do not want is "literary" style. The best style is where there is least style. The simple fact, the definite idea, the pertinent suggestion, expressed in the plainest and most direct words, make up the best style. Precision and definiteness of statement are far more important than strenuous adjectives or elegant turns of phrase.

OUR SECOND NUMBER.

THE first issue of the JOURNAL had a gratifying reception. A reasonable amount of interest and appreciation was anticipated, but the interest is wider and deeper, and the appreciation of our efforts more thorough than had been hoped for. The second number will not, we trust, be found to fall short of the standard set by the first. There are various interesting features in preparation—among them a series of illustrated biographical sketches of notable "Telephone Men"—and it is clear that the JOURNAL has a great field and a great future. We are compelled to hold over a number of contributions and letters to the Editor.

CORRESPONDENCE.

OPERATORS AND THE "JOURNAL."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

We, the undersigned (senior Clerks-in-Charge) wish to say how fully the first issue of the TELEPHONE JOURNAL was appreciated, and we heartily wish a brilliant success for it in the future.

May we suggest, however (unless the matter is already in hand), that if operators are to partake in the thorough enjoyment of same, a page be devoted to their particular work, but written in not too technical a form; the idea being expressed generally that such is the case at present.

If this suggestion is agreeable it would no doubt—

(1) Give operators greater interest and zeal in their work than they even now have.

(2) Make them feel that "the powers that be" are taking an interest in them.

Avenue ..	.. C. FORGE.
London Wall	.. K. BUTCHER.
Bank ..	.. M. F. BUTLER.
Hop ..	.. B. A J. NEWMAN.
Gerrard ..	.. E. RICHARDS.
Holborn ..	.. E. SMITH.
Operating School,	E. M. RALPH.

THE COMPANY'S TELEPHONY CLASSES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

No doubt this is a matter which requires consideration by the officials in charge of the classes. I have found these classes very instructive, and there is no doubt that they have done much to broaden the minds of those who have followed them. As Mr. Williams states, these classes are very mathematical, and this is a great obstacle to many. Thomas Alva Edison in his early days experienced the same difficulty when reading Newton's *Principia*. He could not understand the intricate mathematics of Newtons. He thought some of the things explained with mathematics could be better explained without, and he still argues that in elementary work only absolutely necessary mathematics should be used.

The man wanting to better himself and having only odd times in which to gain knowledge does little by helter-skelter reading. The important thing is to have a systematic course of study that leads step by step to mastery of the subject. After I had been taking the classes for some time, and could see the necessity of study, I took up another correspondence class on telephony, and there is no doubt that it is a good course of instruction.

These are the headings under which this class is built: Arithmetic, mensuration and use of letters in algebraic formulæ, algebra and trigonometry, elementary mechanics, principles of electricity and magnetism, electrical measurements, batteries, acoustics, electrical conditions affecting telephone communication, commercial types of telephone instruments, calling apparatus, complete telephone instrument, telephone switchboards, common battery system, exchange apparatus, party lines, systems requiring no operators, theory of telephony, line construction (overhead and underground), testing. Each of these subjects is gone into thoroughly, and made as lucid as possible.

What I should like to see is a three years' course of instruction, something after these lines. If this could be done it would enable all classes of students to take the course and gain a thorough knowledge of telephony. I should also like to suggest that the course should last all the year round.

Study, no doubt, is hard work at first, but once the student gets interested and can see that he is gaining knowledge, he will not want to throw it up. If the student does not study during the summer months, the knowledge gained is to a great extent "rusty" when he resumes in the winter.

I should also like to suggest that all the instruction papers be forwarded to the student at the beginning of the class, so that the student could get them bound. Or it would be better if the books were bound and indexed before they were sent. I should think the student would be willing to pay the difference in cost. The indexing would add much to the value of the book. It is at present very difficult to find any particular point or formula in a hurry. I should also like to suggest that a "Students' Aid Department" be run in connection with the Correspondence Classes, so that the student could write and ask any questions, not only on classes but on any other difficulty he might meet in his studies. If a student was visiting a town and wished to view the Company's exchange or any other places of electrical interest, he could write to the Aid Department for assistance in getting the necessary permission.

I trust these suggestions will be accepted in the spirit in which they are made, that being the betterment of the technical staff, more particularly the junior portion. —— A. E. RYLAND.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I was glad to see the letter on the above, which appeared in your first issue over the signature of Mr. W. A. Williams, because I take it the classes constitute one of the most important subjects with which we are concerned.

That they have done much, and will do more, to promote the efficiency and welfare of those who have taken advantage of them is, I think, the unanimous verdict of the staff.

There are differences of opinion as to the manner in which they are conducted. One finds fault here, another there, and probably Mr. Williams differs from both.

I hope it is not the rule that the classes are unpopular, as that would hardly be creditable to the staff.

As to the mathematics, they are unquestionably a terror to many, but surely there is a way out of the difficulty. Why not set and work the problems out arithmetically? *Gunn's Arithmetic of Magnetism and Electricity* would pretty well cover the "A" and "B" Courses. Perhaps the Committee will consider the adoption of this suggestion.

There may be cases in which arithmetic is as big a barrier as mathematics. If so, in the name of common sense, let them be met by a course of arithmetic before the other subjects are attempted. This done, the "A" and "B" Courses might be taken up.

After that, a course of mathematics, followed by the "C" or advanced courses of telephony.

The fees are too high, 15*s*. for "A," "B," and "C"; all of which and more can be purchased in book form for 5*s*. Surely there is something wrong which is capable of easy remedy. What say the Committee?

One thing is certain; that without a thorough knowledge of arithmetic and, at least, an elementary knowledge of mathematics one cannot hope to derive much benefit from the classes. —— W. MANN.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

As a junior member of the staff and a student who has had the benefit of the classes, my experience is that the papers fail principally owing to the fact that the majority of students have no one to turn to for advice and aid when in difficulties. Many are disheartened by difficulties which are only on the surface and would disappear if each district had an instructor who could meet the students say once a week to discuss each paper in the various courses.

I feel sure there are capable men in every district who would willingly help in their discussions if they had the support of the authorities. Another point which might encourage the spirit of emulation would be the publication of final results in the JOURNAL, showing the total marks obtained by individuals and the averages, for comparison between the districts.

Leicester, April, 1906. ERNEST RENDELL.

STAFF ORGANISATION.

BY J. ANDERSON AND J. R. THYNE.

(*Concluded.*)

There are two other special branches of the office work, viz., the all-important one of wages, and the not less important one of issue and recovery of material. We saw that the Works Order was the foundation of the procedure already dealt with, and it plays the same important part here.

All are aware of the necessity for grouping expenditure under different heads; it has to be decided whether the cost of each job is debitable to Capital Account or to Revenue, and, if the latter, then to what particular Revenue Account, so that from the totals of the various accounts we shall be able to tell what each department or what each class of work is costing the Company. Further, we must be able to tell exactly what each piece of work has cost us, otherwise we shall not be in a position to profit by our experience as we go along.

These points are all sufficiently met by the system now in force, and the work is neither so difficult nor so complicated as the requirements would lead one to expect.

Perhaps it would not be out of place here were I, for the sake of the junior members of the staff, to attempt a definition of the terms "Capital Expenditure" and "Revenue Expenditure."

Money spent on Capital Account is taken from the capital subscribed by the shareholders, and all money so spent is supposed to be represented by so much plant. Money spent on Revenue, again, is taken from the rentals paid by subscribers, and affects the amount paid to the shareholders in the form of dividends. The amounts spent under Revenue Account go to maintaining and operating the plant erected on Capital Account.

Every Works Order bears at the top the name of the "account" which is to be debited with the cost of the work, and the allocation of expenses in this way lies with the *Cost Department*, and is, in fact, one of the principal duties of the *Cost clerk*. While broad rules are laid down for our guidance, the decision is one which must be arrived at by the application of discrimination and judgment to the circumstances in each individual case. Further, as the Works Order calls for certain work which is clearly defined, and the allocation of the cost has been fixed accordingly, the seriousness of doing any work other than that defined, or of departing in any way from the order, without consulting the Cost Department, will be clearly apparent.

To take up wages first. Every technical employee of the Company carries out his particular duties under a certain Works Order. If he be engaged on steady work, such as the clearing of faults, he works under a Monthly Works Order; while if he is, say, an instrument fitter, and is at times fitting instruments for new subscribers and at other times removing existing subscribers' instruments, he does each particular job under a separate Works Order. Each employee, in order to show what wages are due to him and to show how his time has been employed, fills up a "Time Sheet," on which he quotes the number or numbers of the Works Order or Orders on which he has been working. These sheets are passed to the Wages clerk in Cost Department, who takes from them the number of hours worked by each employee, and enters these with the money value on the No. 4 Return or Wages Statement. From this return the Wages Vouchers are prepared and passed to the cashier, so that he may carry out what *we* generally regard as one of the most important parts of the proceedings.

Another member of the Cost Department takes the "Time Sheets" from the Wages clerk, and makes analysis of the information contained therein. In the Wages Analysis Book he distributes the time spent by the different staffs over the various Works Orders mentioned on the Time Sheets, his total for the week agreeing with that obtained by the Wages clerk when he adds the No. 4 Return. A summary appears at the end of each week's total, showing how much has been spent on "Line Repairs," "Instrument Repairs," &c. This information it will be remembered being also obtained from the Works Orders quoted by the employee on his Time Sheet.

For every Works Order a cost slip is made out. This is a small square sheet ruled off into money columns with the headings of "Wages," "Material," and "Sundries." The totals appearing under each Works Order number in the Wages Analysis Book are transferred to the "Wages" column in the individual cost slips, and this shows at any time what amount has been spent in wages on the work.

When it is mentioned that during each week we have on the average 350 Works Orders running, and that the total number of Time Sheets dealt with per week is approximately 1,200, the magnitude of the task will be realised, and the importance of scrupulous accuracy in making out the Time Sheets will be appreciated.

To come to the question of "Material," the importance of this branch of the subject cannot be over-estimated. When we consider the large and varied stock we keep on hand, and the ever-increasing number of transactions, we are more and more convinced of the necessity of a thorough system of bookkeeping—a system which will work as automatically as possible—and are made conscious of the futility of endeavouring to work by rule of thumb, or of trusting to the smallest extent to the memory of anyone. At the end of November, 1905, the stock on hand in our Glasgow Stores was worth £16,000. The average transactions per month are, receipts £5,500, issues £5,300. The storekeeper receives, approximately, 280,000 requests for different classes of material per annum. When we consider further that an important part of the clerical work of this system has to be carried out by members of the technical departments, the majority of whom, however great their technical skill, make no pretensions to clerical ability, the difficulty in arriving at a practical scheme is increased. Admirable as our present system is, I have long been of opinion that it was here, if anywhere, that a change in our system could be made with advantage.

When an employee requires material he must apply to the storekeeper for same, and pass to him as a receipt a Stores Requisition Slip, with which we are all familiar. I have not for some time been in close touch with the actual working here, but this requisition slip seems to me to possess certain disadvantages. If this is more than a theory, no doubt those members of the various departments, electrical, engineering, and clerical, who use this slip will give expression to their opinions later.

These Stores Requisition Slips bear the Works Order numbers, which have to be debited with the costs, these having been inserted by the employees asking for the material, and after being initialled by the storekeeper, the slips are passed to the Stores clerk in the office. The Stores clerk is entirely responsible for the bookkeeping in connection with stores, and is assisted by a staff of five clerks. From these slips have to be extracted the amount and value of material issued against the different Works Orders, the amount and value of material issued against the different accounts, and the amount and value of each class of material issued. This information is obtained with what seems to be the minimum of labour.

The items on the Stores Requisition Slips are summarised on large sheets known as 'Stores Issued Sheets," a separate "Stores Issued Sheet" being used for each class of expenditure, line repairs, instrument repairs, &c. The material is recorded down the column on the left-hand side of the sheet, one entry for each class of material, while along the breadth of the sheet in different columns appear the amounts chargeable to the different Works Orders. By cross-totting, adding breadthwise, we get the total amount of each class of material issued, and this is shown along with the money value in the column provided on the extreme right-hand side, while by adding lengthwise we get the total amount chargeable to each Works Order, and this appears at the foot of the vertical column in each case.

The totals of the various Stores Issued Sheets are then transferred to the "Stores Outwards Book" under the various accounts, line repairs, instrument repairs, &c., and the totals at the foot of the various columns show the amount and value of material issued against each account. These totals are then transferred to the No. 6 Return, which is a record of the stock transactions for the month and at the same time shows the total value of the stock in hand.

Again, the totals of the vertical money columns are transferred to the "Material" column of the Cost Slip for each Works Order, from which we can get at a moment's notice how much the material for the work has cost us up to date.

We saw how the "Wages" column of this slip was filled up, and the "Sundries" column is filled up in much the same way from the Cashier's Records, so that at the end of any week we are in a position to say how much has been spent on "Wages," "Material" and "Sundries," the three heads of our expenditure, and when the work is completed the total cost can easily be obtained by totalling these columns.

Our Stores Ledgers are now in the form of cards. A separate card is provided for each class of material, and this card is written up to date by transferring thereto the quantities and value of each class of material shown on the extreme right of the Stores Issued Sheets.

I have not dealt with the question of grouped Works Orders under "N." or "R.C." This, I think, may be taken as merely incidental, although a decided saving in labour; nor have I dealt with the bookkeeping in connection with stores received from suppliers or recovered or returned from certain work, but what has been said gives, I think, a sufficient indication of the manner in which these are dealt with.

In much the same way this is also recorded on the card and a quarterly balance is struck between the total value of the cards and the No. 6 Return. Again, at the annual stocktaking an examination of all the material in stock is made, and the results of this survey should agree with the card records. Whether they do so or not is altogether dependent on whether strict accuracy has been observed in writing up the Stores Requisition Slips, whether absolutely no material has been taken from the stores, no matter although only for a short time, without a "Stores Requisition Slip" having been handed over, whether the material actually got from the storekeeper or handed to the storekeeper is sufficiently fully and accurately described on the Stores Requisition Slip, and whether these slips have been properly dealt with by the Stores clerk

I have endeavoured to summarise as briefly and as clearly as possible the whole procedure in connection with the work in which we all take a part, and to show how the little part of each of us fits into the whole, and how important that little part is to the whole.

These are the main features of the Company's clerical system, given simply in rough outline. From each of the divisions mentioned there depend several books and returns of minor importance which it would be of little interest to describe. There are, however, no fewer than three sub-departments of the clerical staff which have not been touched upon, because they have no immediate connection with the main bookkeeping system. These are

The Typewriting Department.—This department consists of four typists who normally take their dictation by telephone and are concentrated in one room. Since the fire we have had to abandon this arrangement and return the typists to the various offices where they were before. It is expected, however, that we shall at an early date restore the department arrangement. This plan was only recently adopted in Glasgow, following the example set by Head Office some time ago. It has many advantages, of which these are the principal:

(1) When one typist is engaged, another is probably free, and thus an officer has a much better chance of having his dictation taken without delay.

(2) In an office employing a large number of typists, a saving in the number of typists is effected, and I reckon that, say, four typists under this arrangement could take as much work as five distributed in separate offices.

(3) Typewriting machines are rather noisy—perhaps the type we use ("Densmore") more than some others. This noise is rather distracting to people engaged on other work, and this worry is saved by having one typewriting department.

The system might, with advantage, be introduced into many of the larger Glasgow business houses.

The Correspondence Department.—Which deals with the receipt of inward and the despatch of outward letters, &c., and with an elaborate system of filing correspondence. The department consists of the Correspondence clerk in charge, with three junior clerks and six messenger boys. The boys are used chiefly for the delivery by hand of local letters, and they were only lately introduced to replace the system of posting such letters. The boys deliver in the course of the year some 84,840 letters and cost us in wages £99, against which the postage of these letters would cost £196, so that we effect an annual saving of £97.

The Post Office Fee Department is under the charge of the Post Office Fee clerk, who has six clerks—girls are employed in this work—to assist. The records of all Post Office fees incurred by our subscribers are made by the Post Office operators on tickets. These are sent to us in daily batches and are immediately posted to the individual subscriber's account forms, which are thus kept up daily. At the end of the month they are totalled, and after the totals have been shown in our books, are rendered to the subscribers. The department deals in a year with about 77,000 accounts, representing fees to the value of £20,000.

Before closing I should like to refer to an important branch of our work which I think is somewhat overlooked though it is work which has to be carried out by the staff of the Clerical Department in common with that of most of the other departments. I refer to the interviewing of subscribers. I read recently of the pains taken by American firms in the training of their representatives, and while we have done something on the lines suggested in our Contract Department, I am afraid we have been content to leave it there. I do not think that any words are required from me to show the importance of this work. Whether it be a clerk behind our cash counter who is being questioned by a subscriber who has called, or a collector or inspector being asked for an explanation of some point by a subscriber on whom he has called—no matter in what way the subscriber and the employee are brought together, the latter is the representative to that subscriber, for the time being, of *The National Telephone Company*, and in accordance with the manner in which he deals with the subscriber that subscriber will form his opinion of the Company and its methods.

If he be met by a smart employee who can straightforwardly give him an intelligent explanation of the point raised, he goes away with the conviction that the Telephone Company knows its business, and when later he experiences some little trouble with the service, as he is bound to do at times, his exclamation is not "What can you expect? It's just like them!" But, rather, "This is unusual; better let them know." Courtesy and intelligence in the treatment of subscribers at personal interviews and by correspondence make all the difference in the subscribers' attitude to the Company, and if the relations between the Company and its subscribers are thoroughly friendly, that is half our business.

If, for instance, when a subscriber calls to remonstrate with us for charging for the removal of his telephone, we stand and let *him* do all the talking, in reply merely muttering something about its being a rule, and so on, we may get that subscriber to pay the account, but we shall not convince him that the charge is a just one. I think it is a good rule in such cases to act on the *offensive* (not offensively, however, but firmly and politely) as well as on the *defensive*, and, while we defend the Company's position, we should at the same time attack the position held by our interviewer—for, although it does not do to tell him so in so many words, his attitude is not always reasonable, nor his complaint always justified.

I think the failure to meet fully the circumstances of the case (and there is failure at times) is not due so much to want of will on the part of the employee, but rather to his want of knowledge of the subject under discussion, and to a certain lack of that civility, almost cordiality, which disarms ill-feeling.

If this be so, what we want is a means of fully informing the staff, or at least those employees who have often to meet the public, on all points on which they are expected to supply information, and we want to impress on them the necessity of always talking pleasantly and cheerfully.

Were this done to a greater extent than at present, I am sure the result would be that the staff themselves would find greater pleasure in their work, that the subscribers would be much better pleased, and consequently that the Company would gain considerably.

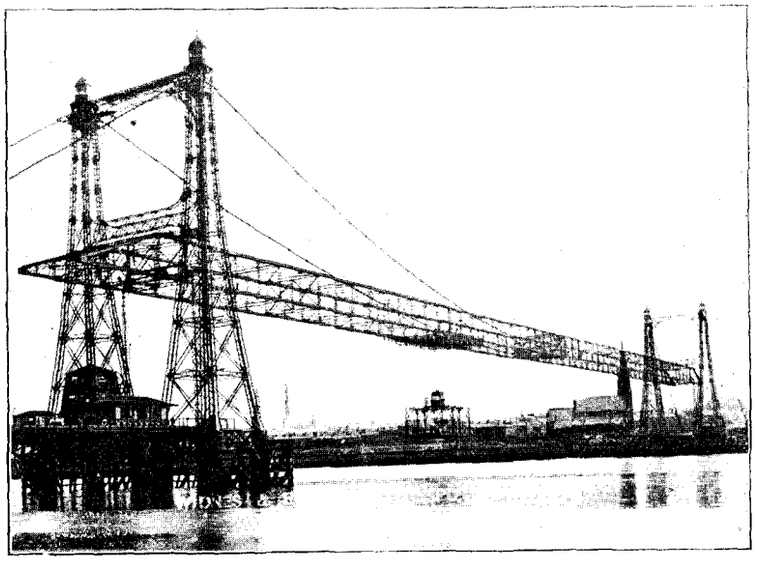
THE TELEPHONE IN FIRE ALARM WORK.

FROM the latest report of the Leicester Borough Fire Brigade it appears that out of a total of 189 fire alarm calls received no less than 92, or nearly 50 per cent., were sent by telephone, either through the regular exchange service or by means of the street alarm-post telephones.

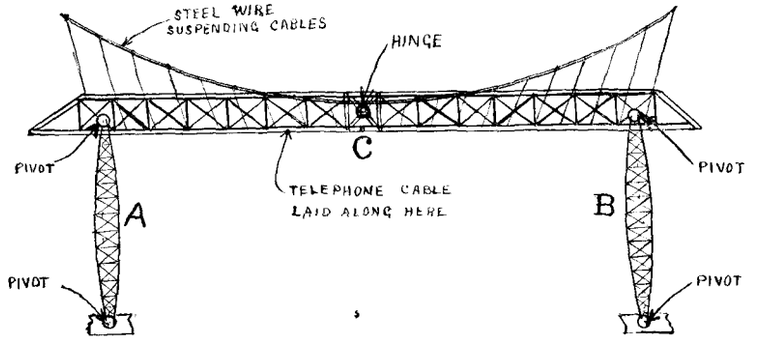
CABLE OVER THE MERSEY ON THE RUNCORN AND WIDNES TRANSPORTER BRIDGE.

A FIFTEEN-PAIR dry-core armoured cable has recently been laid over this bridge. Owing to the peculiar construction of the bridge, it has been found necessary to adopt special precautions to prevent friction, undue tension, and torsion of wires and cable.

The bridge is of the "transporter" type, and is in design precisely similar to an ordinary stiffened suspension bridge, with the exception that the approaches to the bridge are at a low level, the traffic being carried over in a car suspended from the under side of the stiffening girders. The accompanying photograph shows the car nearly in the centre of the bridge. The span is 1,000 feet.



There are several bridges of this type on the Continent, but they differ in general construction from the Runcorn Bridge. In this bridge the stiffening girders are hinged at the centre of the span, so as to minimise the stress due to deflection from changes of temperature. To allow for longitudinal expansion and contraction the girders are fixed to vertical rockers situated at each end of the bridge, between the towers; a glance at the accompanying sketch



may give the reader an idea of the effect on our cable when the car is travelling across. "A" and "B" are the two rockers, and "C" the hinge in the centre of the span; the car weighs about 80 tons, and when travelling across causes a sag of about 8 inches at the centre of the span; at the same time, there is an independent sag or curvature of the girders directly over the car, and this sag, of course, goes along with the car throughout its journey, thus causing a wave-like motion in our cable; consequently there is considerable friction between the cable and its supports, which were worn quite bright after being in use a few days. Greased pads had to be put between the cable and the supports to prevent injury, while at the centre of the span a large loop was made in the cable.

Below the hinge at the centre of the bridge the framework opens when the car is passing, causing a gap of about three-quarters of an inch at the point where our cable lies; this gap closes up again when the car has gone by; to prevent torsion and undue tension on the cable at this point the large loop in the cable has proved to be very effective, as no bending whatever can be observed when the car is passing.

The car passes this point every five minutes for seventeen hours a day, so one can imagine how long the cable would last if bending did occur.

MR. DOOLEY ON THE C.B. SYSTEM

(With all necessary apologies.)

"Yis, Hinnissey, ye're right there. the C.B. systim has come to stop. Divil a doubt av it."

"Phwat are th' advantidges?"

"Shure, they're viry obvious, rayjooced maynt'nance, better thransmisshun, quicker operatin', an' others too numerous to menshun. Th' operatin' is wan of th' most important, th' operators, bless their little hearts, will look afther 50 per cint. more lines, an' give 250 per cint. better service; in fact, th' operators will take 130 lines as easily as fallin' off a tram."

"Phwat about th' inspectors?" says Hennessey.

"Ah! there ye are, th' jooce for th' talking comes over the line from th' exchange now, th'll be no local battheries, there'll be no more callin' at the subs. with a new batthery card or new zinc or what not so as to talk to th' pritty typist agin. No takin' th' cills to th' tap in th' kitchen, an' squeezin' th' good lookin' housemaid whin th' cook isn't lookin'. No," mused Dooley sadly, "thim times will be passin' away. A new sort of inspictor will come in, he'll have B.Sc. afther his name."

"Phwat is B.Sc. for, Dooley?"

"Why Blighted Scientist av coorse," says Dooley, witheringly, "He'll have a bhoy to carry his bag round fer him, he'll have with him a pocket voltmeter to misure th' P.D. at th' window terminal, an' a Megger."

"Phwat will he be wantin' a Megger for, Dooley?"

"Why to misure th' attenuayshun constant av th' office wire, ye ignoramus."

"Bedad, Dooley, ye seem to know all about it."

"To be shure I do, haven't I stoodied "C" Course through an' through. Why I can raypate th' table of ayquivalents backwards, or do ye a diagram av an order wire jooncshun with silictive ringin' an' machine keys, with me lift hand, an' with both eyes shut. With th' new type of inspictor, there'll be no more cases av th' switchhook bein' rayported faulty, an' bein' cleared by raycharging th' cills. No, Hinnissey, th' calm raysonin' av th' thrained scientist will be brought to bear on it. Th' inspictor will prove by mathymatical formula worked out to three dicimal playces on th' slide rool, that th' sub. lift th' resayver off just 87 minutes 17·125 seconds ago, or as th' case may be. Th' sub. will diny it av coorse, but th' figures will bate him."

"Wonderful!" ejaculated the astonished Hennessey.

"As fer th' subscriber, th' confirmed grouser 'll have no excuse fer callin' up th' Test Clerk or th' Exchange Manager an' havin' a slangin' match, or fer blayguardin' th' operator all th' year round, thin thrying to square her at Christmas with some gloves or a box av chocolates. No, Hinnissey, th' operatin' 'll be so rapid that th' only grumble th' sub. 'll have lift to him 'll be that th' operator answers before he can ayjust the resayver to his ear.

"Instid av th' operator replying ingaged, she will plug him on to th' 'busy' signal, an' th' sub., instid av gittin' his number, 'll git a 'Toot-toot,' 'Toot-toot.' Ye can imagine a sub. not use to it, an' in a divil of a hurry workin' his switchhook, and askin' phwat th' divil he's bin put through to a motor garridge for. Or iv th' number don't rayply, th' operator plugs him on th' 'don't answer' signal, an' he gits some more 'Toot-toots.' If he happins to be a motorist he will unconshusly put out his hand to th' brake lever, and put his fut down to unclutch th' ingine."

"Now between you an' me, Hinnissey, I've got a gr-r-r-and idea. Instid av th' tone test for the busy signal, we'll have a tillygraphone circut—ye know phwat that is—th' tillygraphone would raypate at intervals a few bars of music. For ixample, for th' engaged signal there might be a few bars av 'Thry agin Johnnie,' that song from th' *Counthry Girl*, an' for th' don't answer signal, a bar or two from that bewtiful song th' 'Better Land,' inthrodoocing 'Not there, not there, me child.' Shure 'tis a most illigant idea, for ivery one knows those songs, av coorse, an' the bearing of a raymark lies in the applicayshun, me bhoy."

"Have ye seen th' new C.B. switchboards for th' subs.' offices? They're illigant I can tell ye; Phwat with eye-ball signals, supervisory signals, spakin' an' ringin' keys, cut-off relays an' other trimmin's, they're a picture. Th' subs. are beginnin' to tumble to th' naycessity av good operatin' for their installayshuns. In th' near fewcher the subs. will advertise for office bhoys, 'man with a knowledge of tellyphun operatin' preferred.' Th' buddin' office bhoys just about to lave school will attind classes in tellyphunny, an' compayte for prizes offered be th' Nashunal Tillyphun Co. to th' best operators. I rayther think I will shtart some Correspondince Classes on that subject meself, an' advertise it like thim paytent midicines ye hear av. Dooley's School of Correspondince. Lissons in th' gentle art of tillyphun operatin', send eighteen stamps—ye know th' style. Ye may take ut from me, Hinnissey, that th' C.B. systim has a great an' gloorious fewchure in front av ut. Whin his Most Grayshus Mayjisty wishes to honour a great man, such as th' Sicritary av th' Giniral Post Office, doesn't he grant him th' blissid privilige av writin' C.B. afther his name, an' isn't th' prisint Liberal Guv'mint run be th' Premier on th' C.B. systim?"

THE ELEMENTS OF A GOOD SERVICE.

By H. J. Corner.

I am afraid I shall not be able to say anything very new to those who are in touch with the latest developments of telephone practice. My object is rather to provide a *résumé* of what has been and an indication of what we propose to do to improve the telephone service of London.

What, broadly speaking, are the elements of a good service? Let us divide them roughly into two classifications. Firstly, what the operator or, perhaps it would be better to say, the traffic department as representing the operator, expects of the Company, and secondly what the Company expects of the traffic department. On the first of these two classes I propose to raise no discussion and I shall assume for the purposes of this paper that everything on this side is already provided in a high state of efficiency. I hope my assumption will not be too severe a tax upon your imaginations when I state these requirements. They are as follows:—

(1) Efficient apparatus.
(2) Plenty of junctions.
(3) Uniform system.
(4) Minimum of mental effort on the part of the operator.
(5) A universal message or measured rate.

I am quite aware that this demand is a counsel of perfection. But I must insist that before the Company demands of us a service showing 100 per cent. efficiency, it must provide us with the nearest possible approach to these requirements. I am not going to dwell on these, but I should perhaps say a word as to the last of these points, which at first sight does not appear to have any very obvious connection with the subject we are considering. That it does, however, have a very real and important bearing on the question of a good service can very easily be shown. One result of a universal measured rate would be to induce subscribers to have more instruments. They would see that it would pay them and the result would be the inestimable blessing of a reduced number of engaged signals, involving a saving of time, temper, and junction load. Further, the universal adoption of message rates would tend to diminish the calls per line by eliminating frivolous or useless messages, and thus again relieve the junction traffic and enable the operator to deal with more subscribers' lines.

I pass on to consider the second class of requirements and tabulate those things which the Company may fairly demand of the operator. They are

(1) Politeness.
(2) Accuracy.
(3) Speed.

These points are, of course, so obvious that they may fairly be taken for granted, but the first is so essential that I should like to emphasise it with all the force at my command.

Some while ago I saw a service report from a subscriber which said "The civility and good temper of the operators in this exchange compensate for the occasional ineffectiveness of the service." This is a proof of how much can be done by the exercise of the inexpensive virtues of civility and good temper. There is probably no business where the "soft answer" that "turneth away wrath" is of more value than in ours. It was pointed out the other day that the telephone is responsible for a great and deplorable increase in the brutality of manners, that men say on the telephone things which they would not dream of saying in the actual presence of another person; it must have occurred to many here how much easier it is to "go for" a man properly on the telephone than face to face. Why this is so is a psychological problem that we are not called upon to solve, but the fact has undoubtedly come home to telephone subscribers, and some of the baser sort are by no means scrupulous in their method of addressing operators. It is this which makes the insistance on a uniformly polite bearing on the part of operators so difficult, and yet on the other hand the use of the telephone rightly considered should be as excellent a training for the temper as it seems to be now an encouragement to violent speech.

It being granted then that these are the requirements for successful operating, it remains now to be investigated how we are to tell what is a good service, and how, not having got it, we may attain it.

The first problem is not so easy as it looks. Some may think that the number of written complaints gives an accurate indication of the quality of the service rendered. This, on examination, however, proves to be the case only to a limited extent. The number of written complaints really reflects rather the temperament of the class of subscribers on a particular exchange (and it is important to bear in mind that each exchange has its own special class of subscribers to cater for) than the quality of the service given by that exchange. Another point to bear in mind is that a subscriber learns to bear the service he is used to, and as this improves and the facilities become more numerous, so he becomes more exigent and more disposed to grumble at minor details which under a more haphazard service he learned to put up with and look upon as one of the necessary concomitants of the telephone system. The service report method, now apparently dropped, has the same disadvantages, and ordinary service testing is equally misleading, for however many calls a man may make himself they must be but a very minute proportion of the total traffic of the exchange, and any conclusions deduced from these experiences are of very little value. There remains the only satisfactory and trustworthy method, that of systematic observation, and records founded thereon. The Americans have made a special study of this work and have published some very striking facts and deductions compiled from a series of observations extended over long periods, which give some very interesting and significant results. These figures have now been discussed and lectured upon and, to put it colloquially, "rubbed in" to us until there is very little left to be said on the subject, except that they demonstrate a state of perfection which I hope is not unattainable in this country, but which has not yet been approached, at all events in the metropolis. This excellent service is the result of this same intelligent and systematic observation extending over lengthy periods and taken under ever-varying conditions, but with the all important constant factor of a uniform system. Until within the last few weeks we have not been able to take similar records in this district and even now the scheme is not fully developed, and of course will not give a result really comparable to American records until all exchanges are working on the same system. I am therefore at a disadvantage in obtaining materials to illustrate and enforce this point, and can only give you the results of a few weeks' observations and some fragmentary records taken at a single exchange with which I have been

TABLE I.—SYNOPSIS OF TRAFFIC OBSERVATION TESTS, LONDON.

EXCHANGE.	Operator Plugged in.	Operator Answered.	Called Subscriber Answered. Outward. Local.	Junc.	Avg.	Inward.	Percentage of Calls answered in 2 secs. or less.	3 secs. or less.	4 secs. or less.	5 secs. or less.	10 secs. or less.	20 secs. or less.	Average Time taken by Operator to Disconnect when Clearing Signal was Outward. Given.	Not given.	Average Length of Completed Connection less time of Conversation. Local.	Junc.	Avg.	Total Operation in secs., i.e., time taken to answer and time to disconnect.
Holborn	4·8	6·0	30·3	31·1	31·0	13·1	21·2	48·7	56·2	67·5	87·5	93·7	9·0	55·0	36·4	41·6	41·0	15·0
London Wall	5·0	6·6	29·5	44·7	41·2	13·6	18·5	34·1	48·8	62·0	80·6	93·0	10·6	...	41·3	55·8	52·0	17·2
Total, average or percentage of 2 C.B. exchanges	4·9	6·3	29·9	39·3	37·4	13·4	19·6	39·7	51·6	64·1	83·2	93·3	10·0	55·0	34·3	50·2	47·9	16·3
Avenue	6·5	7·7	26·4	44·4	37·9	9·5	9·2	21·4	37·8	45·3	70·0	95·7	8·3	58·6	37·8	54·6	48·4	16·0
Gerrard	6·9	8·2	30·1	37·7	35·7	10·9	8·6	21·3	35·3	48·0	72·0	92·0	9·2	12·6	45·2	52·2	51·0	17·4
East	6·1	7·3	26·1	43·9	40·2	16·3	6·5	15·7	35·5	47·3	75·0	96·0	10·6	35·0	42·5	53·7	51·5	17·9
Bank	8·2	10·3	63·3	42·6	44·3	11·3	2·7	13·1	22·7	35·1	66·8	76·5	10·2	42·8	72·5	54·8	56·3	20·5
Hop	6·3	8·2	25·2	41·6	38·7	8·5	8·0	22·3	37·5	45·5	73·2	91·9	12·8	59·0	38·1	57·5	54·0	21·0
Westminster	7·1	9·0	58·0	65·6	64·4	10·7	...	13·5	29·7	48·6	72·9	89·1	12·4	67·0	87·5	72·4	78·5	21·4
Deptford	7·9	9·6	28·4	34·3	33·4	8·8	8·4	21·1	36·6	45·0	70·4	81·6	12·1	71·0	46·1	55·2	47·7	21·7
Paddington	8·7	10·0	27·0	47·2	42·1	17·3	7·9	19·0	28·5	39·6	69·8	87·3	12·2	123·3	46·1	67·5	62·1	22·2
Total, average or percentage of 8 magneto exchanges	7·1	8·6	30·0	42·8	40·0	11·6	7·1	19·2	33·5	44·0	70·8	90·5	10·4	76·5	43·4	62·5	58·3	19·0
Grand Total, average or percentage of 10 exchanges	6·6	8·2	30·6	42·2	39·7	12·0	9·6	23·2	37·0	47·9	73·2	91·0	10·3	75·8	43·3	60·3	55·0	18·5

personally connected. Such as they are, however, they will serve to illustrate my point, which is—the primary importance of records. The first record I would draw your attention to is the record of observations of last December, of which a synopsis is given in Table I. This is classified according to systems of working, showing separately the results obtained from central battery and magneto working. Some of the chief points to be noticed are:

(1) These records were taken in the busiest month in the year, so that you must not take too unfavourable a view of the figures.

(2) They are practically the first records which give anything approaching a representative result by including observations on ten different exchanges.

(3) The superiority of central battery over magneto working is very clearly brought out.

The benefits obtained from the records are manifest. In the first place they indicate to the Exchange Manager with an absolute certainty the weak points in his service; in the second place, they create, or should create, a healthy spirit of emulation amongst the exchanges, and thus the regular publication of them is found to lead to an improvement in the service. It may be of interest to those who are not closely in touch with traffic matters if I give a rough idea of the manner in which the observations are taken. The Central Observation Office is installed in the building next door to London Wall Exchange and its equipment consists of a number of junctions from the different exchanges which terminate in the observation panel at a jack and lamp; the observation clerk is provided with a head receiver and cord, with two lamps known respectively as the subscriber's lamp and the operator's lamp. These junctions are joined up to the various numbers on the exchange from which they come, and in selecting lines to test the following considerations are of importance:—(1) The lines observed should be typical and not either excessively busy or those of notorious kickers, although it is useful to take records on a certain proportion of each. (2) The lines under observation should be unknown to the operating staff at the exchange. (3) The lines should be constantly changed, because it is obvious that the total number of calls observed can be but a small proportion of the total calls made on that exchange, and thus too many observations made on the same line would spoil the representative character of the record. When a call is made the lamp in the panel lights and the observation clerk then plugs in and observes his two cord lamps, thereby determining if the call is inward or outward. If outward, the subscriber's lamp glows and remains alight until he hangs up his telephone again and the relay restores. When the operator plugs in to answer the operator's lamp glows and remains glowing until the plug is withdrawn from the answering equipment or multiple as the case may be. Thus the clear is absolutely distinct, nothing is left to the observation clerk beyond noting the action of the lamp and the time the operator answered after plugging in—an important point, as it is one of the chief objects of these records to make these two actions as nearly simultaneous as possible. If the call is inward the operator's lamp glows as soon as the observation clerk inserts his plug and it remains until the plug is withdrawn. The subscriber's lamp glows and remains alight until the telephone is hung up again. It will thus be seen that every action performed by the operator and subscriber in completing a call is reproduced automatically on these lamps, and the observer can follow all the movements and note the exact time expended on each, and he can also follow any irregularities on the part of the operator or the subscriber or caused by faulty apparatus. The above description applies only to central battery exchanges, but as it is equally necessary to observe the service on magneto exchanges, an additional panel is fitted to take junctions from the latter. The equipment here is somewhat different. The lines terminate on jacks as in the other portion of the table, each jack having a self-restoring indicator across the inner springs with a lamp joined up in the local circuit adapted from the night bell contacts, the restoring coils being actuated by a key which is common to all so that one movement of the key restores all the indicators. The

observation clerk plugs in on the lamp lighting and has to observe all operations and follow the movements throughout by ear alone. This, however, can very easily be done by anyone used to operating and well versed in the exchange circuits.

The records thus obtained are summarised and averaged monthly and the results communicated to the Exchange Manager. An entirely separate record is made of the irregularities noted and thus the Exchange Manager finds himself provided with ample materials for study and with a sure indication of the path along which his most strenuous efforts should be guided in his quest for the great goal of his ambition—the provision of an efficient service. If he is wise he will supplement these records by his own tests and observations and endeavour to create the same spirit of rivalry among his teams as these records do between the exchanges.

These records are the chief means which enable us to judge of the quality of the service rendered by an exchange, but are not by any means the only ones. Peg counts and load lines are another and more familiar method. It is astonishing what a lot of information can be obtained from these load lines by anyone who sets himself to study minutely all their details, provided always that a proper degree of accuracy has been obtained in the count. As this accuracy depends entirely on human agency, nothing but the most unrelaxing supervision on the part of the Exchange Manager and Clerk-in-Charge will guarantee anything but a worthless record, but granted that everything has been done towards this end, a mine of useful information is obtained. In the first place, you have an indication of the time when operators ought to be brought on, the time during which most can be spared for meals and the time when they can go off duty. Nowadays, with an inelastic day of seven and a half hours in force, it is not so easy to manipulate these times to the best advantage as it was some years ago, but by the introduction of split duty and a judicious sprinkling of overtime it is quite possible to secure the maximum of economy with a proper apportionment of the operator's load. To illustrate this point are given two diagrams, Figs. 2 and 3, which represent a load

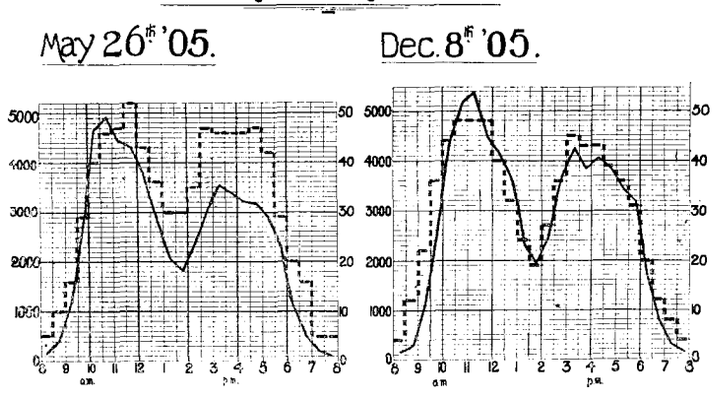


FIG. 2. FIG. 3.

line taken at Holborn Exchange last May, and another taken in December, after the lessons derived from the first had been assimilated, positions closed up, split duty introduced, and operators' duties re-arranged on a scientific basis. Both these load lines are as accurate as I think is possible, the amount of error found by comparing the register records with the peg count being only about 1 per cent.

Many improvements still remain to be made, one of the most important being a fresh conception of what constitutes an operator's load. We reckon a fair operator's load to be 100 calls per half-hour, taking two local calls as equal to one junction call. The diagrams show that the operators are capable of doing more than that during the busiest hours of the day, and further experiments show that the comparative value of junction calls will have to be reconsidered. Precisely what is a sufficient operator's load is a matter of uncertainty, but the figures in Fig. 4 give a guide which will enable us to arrive at some approximation of relative values. These figures are the results of careful observations extending over many weeks; the result is to show that a local call is to a junction

FIG. 4.

"A" OPERATORS' LOAD.

	Time Spent on Call.		
	C.B. to Local.	C.B. to C.B.	C.B. to Mag.
Answer	4·5	4·5	4·5
Obtain junction	...	2·4	2·4
Supervise call	2·1	2·5	3·85
Disconnect	(2)	(2)	2·0
Total	6·6	9·4	12 75
Proportionate value of calls	1·0	1·4	2·0
Number of tests taken...	440	841	842
Percentage of each class of call ...	20	40	40

Time taken to complete 100 calls = 17 minutes.
Number of calls operator can complete in 1 hour = 353.

FIG. 5.

HOLBORN EXCHANGE.

	W/E Jan. 12, 1905.	W/E Jan. 13, 1906.	Diff.
Subscribers	2,770	3,024	9 per cent.
Calls (originating)	164,233	189.999	16 ,,
"A" operators	55	48	− 13 ,,
Calls per operator	2,996	3,958	33 ,,
Speed of answer tests—			
Under 5 seconds ...	41	55	34 ,,
,, 10 ,, ...	74	81	9 ,,
,, 20 ,, ...	90	94	4 ,,

call as 1 is to 1·4 with common battery equipment, and as 1 to 2 with magneto equipment.

It is therefore impossible to fix a figure for the relative value of local and junction calls, but whereas as in this case, the number of magneto exchange calls is exactly the same as those to common battery exchanges, the relative value of a local to a junction call appears to be 1 to 1·7. Call-wire junctions only have been considered, the value of a ringing junction call being considerably higher. Calculating from these figures, it appears that an operator working unceasingly for one hour at full pressure can handle and supervise 353 calls. Attempts have also been made to arrive at a figure of maximum load by experimental methods as was explained in Mr. EDMONDS' paper last year, and the highest number of calls which it was proved an operator could deal with satisfactorily was 280. Where then is the fallacy in the first figure? I think it lies in delay on call wires, some of it inevitable where the operator has to wait a second or so while other operators obtain junctions, but much more of it due to bad working, the result of lack of discipline; secondly, there are the intervals between the movements, which are apparently *nil*, yet in the aggregate amount to an appreciable period; and thirdly, there is the delay on ringing junctions, amounting to 3 per cent. of the whole (the delay, sometimes considerable, caused by the stupid or slow subscriber, is included in the average time of answer). Of course, it is not suggested that an operator should be called upon to do anything like this amount of work, which represents breaking strain, but it gives us a maximum figure to go by in establishing a standard.

Let us look again at some of the lessons which can be drawn from the figures of the load line. If we study the details it will be seen that some positions are taking considerably fewer calls than others. In a perfect system the number of calls taken at each position would be approximately equal, and the Exchange Manager will

therefore immediately proceed to investigate the cause of this discrepancy. Either one position has not enough calls, or the operator there is not doing her fair share of the work. For these two faults there are two remedies, distribution and development of team work. Team work is too familiar a term to need description. The calls which are pouring down too thickly on one operator's position are taken by another "not grudgingly nor of necessity" but because it is part of the principle on which she is working. The beneficial results of the development of team work are clearly shown in Fig. 6, an American diagram.

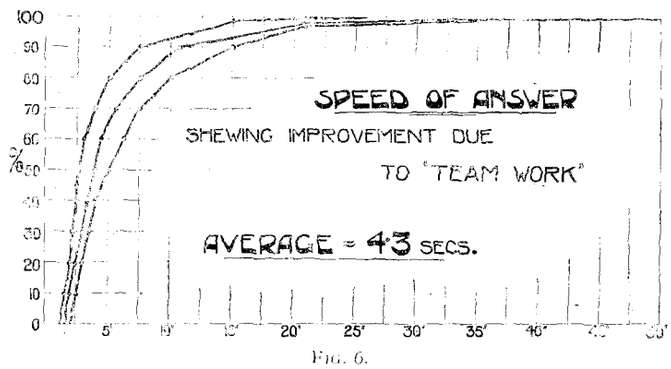


FIG. 6.

Before distributing then, the Exchange Manager must be quite sure that team work is efficient. I have in my mind an instance of a position where I found that 33 to 40 per cent. more calls were being handled than at the adjacent positions. I was at the time distributing subscribers and this was the first position I attacked. After unloading subscribers to the amount of 400 calls a week, I examined the register readings and found the same number of calls was being handled at that position, but that in the adjacent positions there was a distinct decrease in the amount of traffic. The same thing happened the following week with an even greater difference. I came to the conclusion that the middle operator was a glutton for work and that the other two were enjoying an unearned repose at her expense, and no doubt inwardly approving my enthusiasm for distribution. So I dealt with the evil in another way. You will see that over zeal has to be reckoned with as much as slackness. In distributing, therefore, the Exchange Manager must consider the team as the unit, and not the position, and should aim at arranging each team so as to have approximately the same amount of traffic, and then bend his efforts in the direction of the development of team work.

(To be concluded.)

ESPRIT DE CORPS.

BY EDGAR J. FRASER.

PERHAPS the happiest note among the many struck by Mr. GAINE in his opening message is that of the personal interest of the individual members of the staff. The matter is one which will repay much thought, and a few reflections upon it may not be inopportune. So far as personal friendships among ourselves are concerned, an article aiming at fostering *camaraderie* is superfluous; there is none without at least one close friend in the service. But I would ask: Do we all take such an interest in our duties and in the extension and development of the great organisation to which we belong as we might? Do we make such efforts as we might, by judicious conversation, to gather in new subscribers? Do we fully realise that each of us could and ought to be a Contract Department in himself? Do we, indeed, really make the Company a part of our lives, and do *our* full share towards the realisation of our mutual aims? By these questions I do not mean to suggest that, in season and out of season, telephones and Company work are to be the staple subjects of conversation. That is not desirable, but a moment's reflection will conjure up the enormous possibilities of a casual remark or suggestion. If we would only bear in mind that the canvasser's work is not done in the few minutes during which he confronts a prospective subscriber, but *does itself* in the persistence with which the newly discovered need for a telephone connection asserts itself, we would oftimes find the conversational turn where such a remark would not be inappropriate. The Company has nearly 16,000 living Contract Agents. How many act?

To take another view. It may be said that even in the model district much may be done in the way of increasing the interest of the several departments in each other.

A better realisation by all of the difficulties which arise in one department and another would lead to a more intelligent appreciation of the necessity for co-operation, and would reduce friction between departments. A little sympathy extended when a query is addressed to us, a few minutes' explanation, or a helping hand are not lost even if they do not directly affect our own special departmental work. Let there, then, be not lacking on our part anything that may aid the whole work in extension, economy, or efficiency. Let us seize our opportunities and turn them to account. They present themselves daily, almost hourly.

SWANSEA CORPORATION *V.* THE NATIONAL TELEPHONE COMPANY, LIMITED.

NOW that the ligitation with the Swansea Corporation has been advanced a step by the success of the Company's appeal against the judgment of Mr. Justice BUCKLEY, a slight *resumé* of the case may be of interest to the staff, more especially perhaps to those members whose lines are cast in the pleasant places where competition obtains.

The point at issue in this action, put shortly, is—when in a competitive area the Company's competitor obtains under the Telegraph Act of 1899 a right to intercommunication in what way should the traffic created by this intercommunication be carried from one system to the other? The Swansea Corporation when the question arose contended that the Central Exchange of one system should be joined to the Central Exchange of the other, and that all intercommunication traffic should pass through these junctions, each competitor being obliged to provide the necessary junctions to carry such traffic from its out exchanges to its Central Exchange and *vice versa*. The Company, on the other hand, claimed that direct junctions between the various exchanges were necessary for satisfactory service, and that the obligation should be on each competitor to provide junction lines to carry any intercommunication call originated by one of its subscribers from that subscriber's exchange to the exchange on the competing system to which the called subscriber was connected.

The action was commenced by the Corporation and came on for trial before Mr. Justice BUCKLEY on May 3 4, and 5, of 1905, and on May 11 he gave judgment, finding in favour of the Corporation on all points.

The Company appealed and their appeal was heard before Lord Justices VAUGHAN WILLIAMS, STIRLING, and COZENS HARDY sitting as Appeal Court II, on Dec. 11, 12, 13, and 14, 1905.

The Court decided to call in assistance and directed Major CARDEW, R.E., as an independent expert, to advise them upon certain points. Major CARDEW after inspecting the systems of this Company and of the Corporation reported to the Court condemning the Corporation's proposals, and, in effect, advising that the system of direct junctions advocated by the Company must be adopted if the increasing traffic was to be properly handled. On April 11, 1906, the Court gave judgment discharging Mr. Justice BUCKLEY's judgment, incorporating Major CARDEW's report, directing that certain works therein recommended should be carried out, and giving to the Company their costs of the appeal.

The action has, in all, appeared in the Cause List on fourteen separate days. The Company has throughout been represented by Mr. ASTBURY, K.C., M.P., Mr. DANCKWERTS, K.C., and Mr. H. H. GAINE, while the Corporation have relied on Mr. BUCKMASTER, K.C., M.P., and Mr. R. J. PARKER.

WHAT THE COMPANY IS DOING.

During last month two new exchanges were opened by the Company, bringing the total up to 1,218. They are at Whitehills in the Aberdeen district, and Cleland in the Mid Lanark district.

LONDON.—The private branch exchange at Head Office has been transferred to common battery working.

Central Battery Private Branc Exchanges.—The stations given in the following cases in last month's issue were understated, and should be as follows :—

Queen Anne's Mansions...	...	832 stations
De Keyser's Hotel	...	347 ,,
Charing Cross Hotel	...	301 ,,

DERBY.—The new common battery equipment was brought into use on April 30.

BRADFORD.—The building here is being extended, and common battery equipment for 1,300 lines is being planned for new subscribers. This will form the commencement of the new common battery exchange.

FOLKESTONE.—Underground work is in course of construction.

DIDSBURY.—Underground work is in hand here.

BIRKENHEAD.—A large extension of the undergrouud scheme is in hand.

LYTHAM AND ST. ANNES.—Underground work is in course of construction

WAKEFIELD.—Underground work is also in hand here.

BELFAST.—A new power room is being installed, with an additional motor generator and chloride accumulators.

The switchboard has been extended to accommodate 660 additional lines.

Partly owing to the regulations governing the transmission limit, and partly to want of accommodation, a scheme for decentralisation is in course of preparation.

GRIMSBY.—A new central battery for 700 lines has been ordered.

EDINBURGH.—The Central Exchange, to which over 3,600 direct lines are connected, is now working central battery. The capacity of the switchboard is 3,860 lines; and four sections, which will increase the capacity by 1,440 lines, are being added.

As Leith was already common battery, and as the junction circuits to the small exchanges have been specially arranged and condensers fitted in all instruments, the supervisory signalling on the Edinburgh and Leith Exchanges is standard common battery for any connection.

The Portobello system is being put underground, and contractors have the work in hand.

FIFE.—Plans and arrangements are being completed for the purpose of laying cables in the Leven area on account of the Wemyss tramways starting there. At Dunfermline also, underground work is contemplated.

ISLE OF WIGHT.—A piece of work has just been completed at the Isle of Wight in replacing a 12-pair armoured vulcanised india-rubber cable by a 100-pair dry core armoured 10-lb. conductor cable across the River Medina from East to West Cowes. A point to be remarked in the arrangements was the extraordinary delay in negotiating with the Board of Trade for permission to put the work in hand. These negotiations took from early in 1903 to the end of 1905. The cable was sunk three feet deep, and a trench was dredged for about 130 yards as far as low-water mark on each side, the dredger being also brought into use for taking out the cable. A diver was employed, whose duty was to clear the mooring chain on one side of the river by threading the cable underneath it. This being successfully accomplished, and the end made fast, the cable was paid out and the necessary operations for bringing the cable into use were completed.

JERSEY.—The laying of cement blocks and iron pipes in connection with the underground scheme is now completed. This work has taken nine weeks to finish, 6,500 yards of trench being dug up. During the excavations the workmen came across four whole human skeletons, which were presumed to be the remains of French soldiers who invaded Jersey in 1781.

LOCAL TELEPHONE SOCIETIES.

Brighton.—On April 17 Mr. W. Goulden lectured to the Brighton Telephone Society on Pupin's theory of loading lines. The audience was a good one and was much interested in the lecture, which dealt with the theory in a masterly manner.

Blackburn.—The closing meeting of the session was held on Saturday, March 24, when two prizes (value 7*s.* 6*d.* each) were offered for the best ten-minutes papers on "Electrical and Engineering Work." Six papers were read, three "Inside" and three "Outside," Junior Inspector O'Malley, Burnley, being successful in the former and J. T. Slater, draughtsman, Blackburn, in the latter. The financial position of the Society was then explained, and, after electing the committee for the coming session, the proceedings terminated with a hearty vote of thanks to Mr. Remington.

Sheffield.—The last ordinary meeting of the Electrical Society for the present session was held on April 18. The following short papers were read :—"The Construction of Outside Plant," By Mr. C. Marsden, and a paper on "Testing," by Mr. E. S. Byng. A debate was introduced by Mr. S. B. Townsend, the subjects being different statements made as to the fusibility of carbon and the methods of magnetising by divided touch, as described by Sylvanus, Thompson, and Poiser. It was also decided to arrange Saturday afternoon visits to other centres as in previous summers.

Hanley Telephone Society.—This society met on the 6th inst., when a paper was read by the Chief Clerk, Mr. Schofield, on "The Relations between the District Office and the Local Office, especially with reference to the Bookkeeping." The paper turned out a most interesting one, and the discussion that followed it was taken part in by a large number of the members present.

It was intended to make this the last meeting of the session, but owing to the interest taken in this paper another paper which was to be given by Mr. Watkins on "Primary Batteries" had to be adjourned until April 20.

London Telephone Society.—On April 2 a meeting of this society was held at Salisbury House, Mr. C. B. Clay being in the chair. The business of the meeting was the postponed discussion of Mr. C. F. Moorhouse's paper on "Contract Work," his reply, and a paper on "Automatic Boxes and their Troubles," read by Mr. F. M. Hall; the latter discussion being carried forward to the next meeting on April 18. At the meeting held on April 18, Mr. Bailey in the chair, the discussion on Mr. Hall's paper was carried on and a paper by Mr. Mantle, entitled "Speed of Answering," was read and discussed.

NEWS OF THE STAFF.

Mr. A. M. SINCLAIR, late Chief Clerk, Greenock, has been appointed District Manager at Dumfries, vice Mr. J. R. Brown, who, for reasons of health, has been compelled to resign from the service.

Mr. R. B. GRAHAM has been appointed Inspector-in-Charge of Dundalk centre.

Mr. A. B. GILBERT, on March 20, was given two pieces of plate as a token of regard. The presentation was made on behalf of the staff by Mr. Williamson, Local Manager, Torquay, with suitable remarks, which were endorsed by Mr. Squire, Chief Clerk. Mr. Gilbert feelingly thanked the staff for the present and also for the support given him by each department during his district management. He also took the opportunity of bidding the staff an official good-bye, as he was leaving next day to take up his new appointment as Chief Engineer, Glasgow.

Mr. O. C. GOODWIN, Chief Inspector at Canterbury, has been transferred to Folkestone as Chief Inspector of that centre, in place of Mr. J. C. Bacon, recently removed to Guildford district.

Mr. L. JONES, Engineering Inspector, Potteries District, has resigned from the Company's service during this month. He was only lately transferred from Birmingham. On the occasion of his leaving the staff presented him with a Wedgwood tea-set. Mr. Jones was trained as an apprentice at Birmingham, and has done good work both there and in the Potteries whilst with the Company.

Mr. W. F. RHODES, Local Manager, Canterbury, has been transferred to Ramsgate.

Mr. C. W. BUFTON, Chief Inspector, Dover, has been transferred to Canterbury as Local Manager.

Mr. R. J. DOWNING, Wayleave Officer, Reading, has been transferred to Colchester as Local Manager in place of Mr. W. C. Burrows, who has left the Company's service.

Mr. G. H. ROGERS, Local Manager at Ramsgate, has left the Company's service to take up an appointment with the Bell Telephone Company, Montreal, Canada. Mr. Rogers entered the Company's service, in September, 1898, as Stores Clerk at Canterbury, and at various times handled almost all branches of the district office work; in August, 1903, he was appointed Local Manager at Ramsgate. Prior to his departure for Canada, Mr. Rogers was presented—by the Ramsgate staff—with a gold signet ring, bearing his monogram, and suitably inscribed inside. The district office staff at Canterbury expressed their good wishes for Mr. Rogers' future in a special letter addressed to him.

Mr. J. MCEWEN BROWN, Chief Electrician, Leicester, has been transferred to the electrical staff, Edinburgh. He was presented with a handsome smoking cabinet by the staff.

Mr. S. C. COWARD, Contract Manager, Leicester, has temporary charge of electrical staff pending the appointment of a Chief Electrician. Mr. Coward was late Contract Manager at Birmingham, and for a short time at Sheffield.

Mr. H. DICKINSON, late Assistant Engineer at Southampton, was presented by the engineering staff at that place with a very nice writing set as a mark of their appreciation, on his appointment as Local Manager at Winchester.

Mr. A. C. HALEY, District Manager, Bolton, has been away from business since April 13 suffering severely from *hemicrania*. The sympathy of the staff, together with good wishes for a speedy recovery, are heartily extended to Mr. Haley.

Mr. T. O. C. PARNELL, on his appointment as Chief Inspector of Bath, was presented by Mr. E. L. Preston, on behalf of the Bristol staff, with a silver cigarette case and a fishing rod.

Mr. H. M. MILLER, Complaints Clerk, Edinburgh, has been appointed Observation Clerk, vice Mr. A. H. Smith resigned.

Mr. JOSEPH ORR, late of Renfrew, has succeeded Mr. George Wilson as Storekeeper, Edinburgh.

Mr. A. McLEAN (Construction Engineer, Fife district) and Mrs. McLEAN celebrated their silver wedding on Friday, April 7. Among those present were Mr. and Mrs. J. H. Storrie, Mr. R. Inglis, Chief Clerk, and Mr. D. Lambert, Chief Inspector, also Mr. J. Whyte, representing the outside staff. Mr. and Mrs. McLean received over 30 presents, towards which the staff contributed a handsome barometer, with the following inscription:—"Presented to Mr. A. McLean, on the occasion of his silver wedding, by the employees of the National Telephone Company, March 25, 1906," also a beautiful silver cream and sugar service for Mrs. McLean. Mr. McLean has seen considerable changes in the service since he first joined in 1884, 21 years ago, and is proud to say he ran the first line in the Fifeshire district.

Mr. F. A. GILLAM, Correspondence Clerk at Brighton local office, on the occasion of his marriage, which took place at Easter, was the recipient of a marble French clock, subscribed for by the general staff.

Mr. E. DRESCHER, Collector, district office staff, Hull, was married on Saturday, April 14, and has been presented with an oak clock by the District Manager (Mr. C. C. Worte) on behalf of the rest of the staff.

Mr. E. ROWAN (Head Office Audit staff) was married on April 12, at St. Faith's, North Wilford, Nottingham, to Miss Alice Scholey (Notts Factory). Prior to leaving the Company's service, Mr. C. E. Fenton, Factory Manager, on behalf of the combined factory and Engineer-in-Chief's testroom staff, presented Miss Scholey with a lady's kit bag, together with a fitted dressing case, as a token of the good wishes of her colleagues at the factory.

Mr. WOODWORTH, Chief Clerk of the Contract Department, Cardiff, was presented on March 17 with a handsome black marble clock, suitably inscribed, on the occasion of his marriage.

Mr. F. SUMMARSELL, Local Manager, Ipswich, was married to Miss E. M. Weston (both late of the Reading staff) on April 4, at South Merstham. A presentation of a dinner service was made on behalf of the staff by Miss E. G. Wilding (Chief Operator).

OBITUARY.

Inspector JONES, of Pontypridd, we regret to learn, died on Saturday, the 14th inst. He had been on the staff of the Company since the beginning of 1892.

Past and present members of the Glasgow staff, as well as his many other friends, will regret to learn of the death, on Monday, April 9, of Mr. ALEXANDER LAMB, sen., who for so many years acted as Chief Canvasser in the Glasgow district.

STAFF GATHERINGS.

Bradford.—The second annual dinner of the staff of the West Yorkshire district took place at the Talbot Hotel, Bradford, on the 31st ult., the District Manager (Mr. H. B. Sutcliffe) presiding.

There were also present Messrs. J. Scott, District Manager, Manchester; W. V. Morten, District Manager, Leeds; C. Crompton, Sectional Engineer, Bradford Post Office, etc.

Some 60 members of the Manchester staff responded to an invitation to attend.

The dinner, which was of excellent quality, was followed by a smoking concert. The musical programme being provided by members of each staff.

A football match between the West Yorkshire and Manchester district staffs at Saltaire resulted in a win for the latter by 2 goals to 0.

Leeds.—The annual Mid Yorks staff dinner took place at Powolny's, Leeds, on March 24, Mr. Morten, the District Manager, being in the chair, supported by Mr. Sutcliffe, of West Yorks. A short statement as to the Company's standing was made by Mr. Morten, and Mr. Sutcliffe also gave a few remarks in respect of the late staff transfer meeting held at Manchester. The feature of the evening's entertainment was undoubtedly a very clever exhibition in card manipulating, conjuring, etc., carried out by Mr. Vickerman of the Contract Department. A very enjoyable evening was spent.

Edinburgh.—A combined dinner of the Local with the Head Office and Western Electric Company's staffs, at present engaged on the conversion and extension of the central switchboard, was held on the evening of Friday, April 6, in the Peacock Hotel, Newhaven. Proposing the toast of the "National Telephone Company," Mr. Carey of the Western Electric Company referred to the pleasant relations existing between his own and the Company's staffs. Mr. Robert Wilson (District Office), Mr. D. McIntosh (Engineers' Office), and Mr. Rathbone (Head Office staff) replied on behalf of their respective departments—the latter also reciprocating the compliment by toasting the Western Electric Company.

The Ampère Golf Club was inaugurated at a meeting of the staff on March 1. A committee of five—including the captain, Mr. R. Wilson (Chief Clerk), and the secretary and treasurer, Mr. J. H. Allan—was appointed, and competitions were arranged.

Brighton.—The engineering staff at Brighton held their annual dinner at Chatfield's Hotel on March 23. Mr. F. W. Taylor, District Manager, presided, and was supported by Mr. H. J. Maclure, Contract Agent; Mr. F. Roberts, Local Manager; and Messrs. H. Legge, J. H. Watkins, and G. Batchelor, engineers. About 80 sat down to a capital dinner, after which an excellent musical programme was gone through and the usual toasts honoured. One feature of the proceedings was the presentation of a marble clock to Mr. G. Batchelor, who was leaving for Southampton to take up engineering duties at that centre after nineteen years' service at Brighton. Some very complimentary remarks were made in reference to the Chairman, which were fittingly acknowledged by him. Those contributing to the musical part of the proceedings were Messrs. Vowles, W. Knight, Moon, Metherell, Roberts, Farrow, Ricketts, Downing, Siffleet, and Legge; Mr. Vowles acting as accompanist. Mr. J. H. Watkins carried out the arrangements, which resulted in a great success.

On March 30 the indoor staff at Brighton dined together at Booth's Restaurant, Mr. Taylor, District Manager, presiding over a large company. Among others present were Mr. H. J. Maclure, Contract Agent; Messrs. H. Legge and J. H. Watkins, engineers; Mr. E. Armstrong, Local Manager, Hastings; and Mr. S. J. Pharo, Traffic Manager, of Portsmouth. The usual toasts were given, and speeches made by the Chairman, Mr. Maclure, and Mr. Pharo. The opportunity was taken of presenting Mr. Taylor with a handsome illuminated address (the work of Mr. Siffleet, one of the staff) containing the names of over 260 subscribers to the recent presentation of plate. A musical programme was carried out, those contributing being Messrs Starkey, Bilton, Pharo, Downing, Dobson, and others; Mr. E. G. Islip presiding at the piano

Blackburn.—The male staff held their annual dinner and smoker at the White Bull Hotel on Saturday, March 24, covers being laid for 70 people. The District Manager, Mr. C. Remington, presided, and expressed his pleasure at seeing such a large gathering, more especially as all grades of the Company's service were represented. After dinner an excellent programme was submitted.

Burnley.—The National Telephone Company's Football Club, having entered for the local Hospital Cup and Medal competition, were drawn to meet Messrs. Jackson's team in the first round. The match took place on the Athletic Ground on March 28 before a fair number of spectators. Good play was shown by both sides, and no score was recorded up to half-time. In the second half, however, the telephonists had the best of the play, and retired victorious by two goals to *nil*.

Belfast.—*National Telephone Football Club.*—This club (Association) was organised in 1906, and in that season played 21 matches, six of which were won, nine lost, and six drawn, scoring 36 goals against 36. In season 1905-6 they played thirteen matches, won ten, lost one, and two were drawn, scoring 42 goals against sixteen. The club is in possession of a very fair ground, and its colours are maroon and white.

Liverpool.—A successful whist drive, organised by the Royal Exchange, was held on March 24 at the Avondale Café, Church Street, Liverpool. There were 25 tables, and prizes (which were presented by Mrs. Hidden) were won by the following:—Ladies: Misses Lee, Parry, and Adlington. Gentlemen: Messrs. Parry, Roscoe, and Pike.

The Central Exchange also organised a very successful whist drive on April 7, held in this case at the Grand Central Café, North John Street. There were 33 tables, and prizes were won by the following:—Ladies: Mrs. Prim, Misses F. Edwards, L. Durandu, and B. Gregson. Gentlemen: Messrs. Hughes, Carew, Bass, and Lloyd.

Dublin.—The first annual dance of the staff was held at the Dublin Bread Company's Restaurant, Lower Sackville Street, on April 19. Dancing was commenced at 8.45 p.m. and continued until 2 a.m.

The dance was a great success and thoroughly enjoyed. Mr. Sibley (who was present with Mrs. Sibley) returned thanks to the staff for the assistance rendered to him in controlling the Dublin district.

The arrangements were in the hands of the hon. sec., Mr. J. McShane, Messrs. Bury and Carey making capable M.C.'s.

London.—*Football: Clay Challenge Cup.*—This cup was presented by the Metropolitan Superintendent for competition between the staffs of the London districts. The first holders were Head Office, and for 1903-4-5 the cup was held by the Southern district. As this district is now merged in the Metropolitan district it was hoped that the different departments might raise teams to compete, but as this was found impossible, owing to inability to obtain sufficient support, the Head Office staff challenged the Salisbury House staff for the right to hold the cup for 1905-6.

The match was fixed for March 31 at Harrow, and resulted in a draw of one goal each scored by Hale for Head Office and Hibberd for Salisbury House. Extra time was played, but produced no goals.

A replay was therefore arranged, and took place the following Saturday at Tooting, when Salisbury House won by two goals (scored by Hibberd and Stewart) to one (by Hale).

The game was exceedingly fast and troubled not a few of the players to keep going. Head Office should undoubtedly have scored on at least two occasions, whilst the one they did get was a very soft affair. Both the goals obtained by the House team were well worked for, and during the second half they were almost continually pressing.

The defence on both sides was far superior to the attack; Crow, of Salisbury House, and Valentine, of Head Office, specially distinguishing themselves.

Mr. G. Hack (Stores Department, Salisbury House) refereed in satisfactory manner and impartially, and the game was fought in very good spirit.

TEAMS.

Salisbury House.—F. C. French; W. Crow and W. Howe; H. Taylor, A. Marshall, and A. E. Wild (captain); F. Jewell, C. Richards, F. W. Hibberd, H. Gilbert, and C. Stewart.

Head Office.—T. E. Hanson; C. Valentine and J. Woodford; J. J. Witchell, H. M. Darville (captain), and J. Clarke; J. Harrison, C. Melener, W. Hale, S. Bees, and H. Bees.

London, South-East District.—On Friday, March 16, the members of the Hop Exchange operating and maintenance staffs spent an enjoyable evening to commemorate the opening of the new Common Battery Exchange. The new

dining-room, which seated 80 guests for tea, had been tastefully decorated with bunting, and the tables with palms and vases of flowers. C. B. Clay, Esq., Metropolitan Superintendent, presided, and letters of regret for unavoidable absence were received from Service Superintendent Mr. C. M. Bailey, Mr. Corner, Mr. Benham, and Miss Adams. Among the guests present were Mr. Harvey Lowe, Chief Accountant, Mr. H. Davis (late District Manager), Mr. C. Elliott, Metropolitan Engineer, Mr. J. F. Edmonds, Traffic Manager, Mr. G. Greenham, Maintenance Electrician, with various members of the Traffic Department, and the local officials Tea was followed by a musical entertainment, which was highly appreciated by all present. The thanks of the staff were due to the following ladies and gentlemen, who contributed to a most successful evening:—Miss B. Mann (Hop), Miss Turner, Mr. Macgregor (North), Mr. H. Taylor (Hop) and Mr. Chapman (Gerrard). Mr. Saunders (Avenue) and Miss Gibbs (Hop) assisted at the piano. During the evening Mr. C. B. Clay gave, in a speech full of kindly humour, reminiscences of the previous Hop Exchanges, of which the present was the fourth, and made some eulogistic remarks on the work done by the Hop staff. Speeches by Mr. J. F. Edmonds, London Traffic Manager, followed. Mr. P. J. Kidd, District Maintenance Electrician, and Mr. C. W. Piggott, Exchange Manager, followed, and a vote of thanks to Mr. Clay terminated the proceedings.

Bristol.—On April 7 an Association football match—Clerical *v.* Electrical staff—was played here, resulting in a win for the electrical staff by three goals to *nil*, thus reversing last year's result.

Leicester.—On behalf of W. H. Taylor, a former linesman who has been in the service for a number of years, but is now unable to follow his employment through consumption, a concert is being organised by Leicester staff, to take place early in May. Taylor served at Brighton, and also went to South Africa at the time of the Boer war. It is hoped to raise a goodly sum, and interested friends can get full particulars from Mr. Wooloff, Storekeeper, Leicester.

RAPID REPORTING BY TELEPHONE.

ENORMOUS interest was taken throughout Ulster in the Rugby International football match on March 12, between Ireland and Wales. The proprietors of *Ireland's Saturday Night* made ample arrangements for providing its numberless readers with a graphic description of the game and special notes by home and cross-channel experts. Thanks to the courtesy of Mr. Kenneth MacRae, secretary of the Royal Ulster Agricultural Society, and Mr. A. T. Greer, honorary secretary Northern Branch Irish Rugby Union, and the admirable assistance rendered by Mr. Gilmour, District Manager of the National Telephone Company, and his able staff, the editorial room of this paper was in direct telephone communication with a box situated practically on the edge of the playing field. By this means we were enabled to keep in touch with the progress of the game, while the half-time score and result were received by us ere the sound of the referee's whistle had died away. In this connection, it is interesting to note a remarkable feat in newspaper reporting. A Swansea contemporary was connected with the telephone exchange in this office at the moment when the result came through from Balmoral. The score was then transmitted to Swansea, and our contemporary had the satisfaction of knowing that it had received the result from a distance of, roughly speaking, 400 miles, by telephone, a minute after the referee had declared the game at an end. We also received requests for the result by telephone from Cardiff, Birmingham, Edinburgh, and Glasgow.—*Belfast Evening Telegraph.*

SUBSTITUTION OF CABLES AT LIVERPOOL.

IN further reference to the note in the April JOURNAL with regard to the cutting over of underground cables, appended are some further particulars. The cost per yard of cable handled, included cable drawn out and cable drawn in in both cases, but did not include the charge for horses, which were necessary in any case for moving the drums. The cost for the use of the horses in drawing out the cable, and the work mentioned under (*a*) was 2*d.* per yard, and under (*b*) 1*d.* per yard. The time charged for in connection with the work is from the time the men entrained at Liverpool to the time the job was finished and the men left Waterloo, where the work was carried out in both instances. Both jobs were personally supervised by the Local Manager and Assistant Engineer, neither being entitled to any extra pay, and no supervision cost was shown, but at ordinary rates, assuming the work had been done on an ordinary day, the supervision cost would have been (*a*) ·33*d.*, (*b*) ·22*d.* per yard.

Everything that could be done beforehand was cared for. Wires in existing cables were numbered and labelled at each end. Split bends and pipes were opened and verified, so that there could be no mistake as to their position. A diagram was prepared to show the direction in which the drawing out and in was to be done, and lengths or sections were allotted to each gang.

Subscribers were informed that they would be disconnected from the time of cutting and joined up at the earliest possible moment. The operators were kept in touch by means of a special wire to the exchange and were informed as each subscriber's line was joined up, they in turn advising the subscriber. A call office was provided in a convenient spot for the use of subscribers disconnected.

The tackle and drums were carted to the section ready, so that when the gangs arrived at night they began at once to get the drums stooled off and winches in position.

Some difficulty was experienced in starting a cable that had been in six years owing to the grease on it having become hard and holding the cable to the pipes Service winches were then used to start the cable moving, with satisfactory results.

Cables drawn out by horses were found to be perfectly cylindrical, and were laid in the roadside until the gangs had drawn in the new, precautions being taken to protect them from damage. The drumming of the recovered cable was accomplished by having about twenty men spread out about three yards apart, who lifted the cable on to the drum. The extra gear was loaded up and sent away to the depôt and the holes prepared for the jointers.

THE INVENTOR OF THE TELEPHONE HONOURED BY EDINBURGH UNIVERSITY.

DR. ALEXANDER GRAHAM BELL has had many honours bestowed upon him in recognition of his great triumph, but it must have been with peculiar gratification that he received, on Thursday, April 12, the honorary degree of LL.D. from his old college.

Dr. Bell received his early education at the Royal High School of his native city, one of his teachers there being now Principal of St. Andrew's University, the Senatus of which conferred upon him two years ago *in absentia* the highest honour in its power. In 1870, on account of his health, Mr. Bell left this country and took up residence in Brantford, Ontario, where the telephone was invented—a fact which has gained for it the name of "The Telephone City." The invention was patented in 1876.

In presenting the distinguished graduand on April 12, Sir Ludovic Grant said:

"Amongst the achievements of modern science none is more wonderful or beneficent than the removal of barriers which disease and distance alike present to the transmission of human speech. The glory of this two-fold triumph rests in large measure with Professor Graham Bell. In him we see the author of some of the chief developments in the methods of teaching the deaf and dumb, and in him we see the practical inventor of the first articulating telephone. The son of a citizen of Edinburgh, Alexander Melville Bell, who gained celebrity by his scientific analysis of the elements of speech, Professor Graham Bell was at an early age started on the path which has conducted him to name and fame. It is largely by the application of his father's system that Professor Graham Bell had done so much for the advancement of those institutions which seek to impart hearing to the deaf, and means of expression to the dumb. His achievements in this sphere, no doubt, suggested to him the undertaking of more general utility—the solution of the problem of telephonic communication. The annals of scientific discovery contain no chapter more interesting than that which records the long series of preliminary experiments. But at last by substituting undulatory for intermittent electric currents Professor Bell succeeded in effecting the transmission of articulate speech to a distance. It is a noteworthy circumstance, as showing that the telephone is of truly academic origin, that on the first occasion on which the infant instrument emitted intelligible utterance, the Professor stood at one end of the wire and a student at the other. His native city is proud of her illustrious son, and the name of so signal a benefactor will add lustre to our academic roll."

Principal Sir William Turner thereafter conferred the degree, and amidst loud applause Professor Bell took his place among the honorary graduates of his *Alma Mater.*

GOOD MANNERS.

Do we scare away business? Do we make claims more difficult to adjust? Do we antagonise the public by the way we answer the telephone? A test was made by calling each contract office. Some answered a cheery "Hello,"—some "Yes,"—some "Well,"—some snarled out their salutations,—one girl was flirty. Some replies were chilly, and, on the whole, we showed a decided lack of good manners. This and other tests are not to catch anyone for punishment, but to detect weaknesses and show how they can be corrected.

Charles Reade wrote a book—*Put Yourself in His Place.* It is the Golden Rule written another way. Apply it to telephone conversations and good results are certain.

The best answer—"District Manager"—came from Camden.

The standard answer should be: "Camden District Manager's Office," "General Contract Agent's Office," etc. When calling from the Company's Office, reply to the answering party:

"Mr. Brown, of the Bell Telephone Company, wishes to speak to Mr. Zeigler." This saves the usual

"Hello!"

"Hello! Mr. Zeigler in?"

"Yes; who wants to speak to him?"

"Mr. Brown, of the Bell Telephone Company."

Time is money—save it; courtesy is cheap—use it; friends are more desirable than enemies—make them.—Philadelphia *Telephone News.*

A SIGN OF THE TIMES.

THE following advertisement, circulated by an American business college, contains interesting testimony to the important part now played by the telephone in business life. English business colleges might well follow the example set here and make training in the proper handling of the telephone service a part of their course:—

"A PHILADELPHIA COLLEGE WITH A NEW IDEA.

"THOUSANDS OF DOLLARS ARE LOST THROUGH THE *Careless* USE OF THE TELEPHONE.

"THOUSANDS OF DOLLARS ARE MADE THROUGH THE *Careful* USE OF THE TELEPHONE.

"AN ACTUAL FACT.—A canvass among 300 stenographers showed that 70 per cent. of them had never used a telephone before entering their present positions. This proved conclusively to us the need of a proper telephone training for every clerk and stenographer, in order to meet the demands of this telephone age.

"WHAT WE HAVE DONE. We have installed a complete Bell Telephone Private Branch Exchange, and are schooling our students to handle a private branch exchange, to send and receive messages properly, to receive telephone dictation, and in telephone etiquette.

"Every graduate of our school receives a course in the use of the telephone. We will be glad to furnish carefully schooled clerks and stenographers without charge. Telephone us for details.

"PHILADELPHIA BUSINESS COLLEGE,
"1,017 Chestnut St.—Tel. Filbert 3892—Philadelphia."

THE
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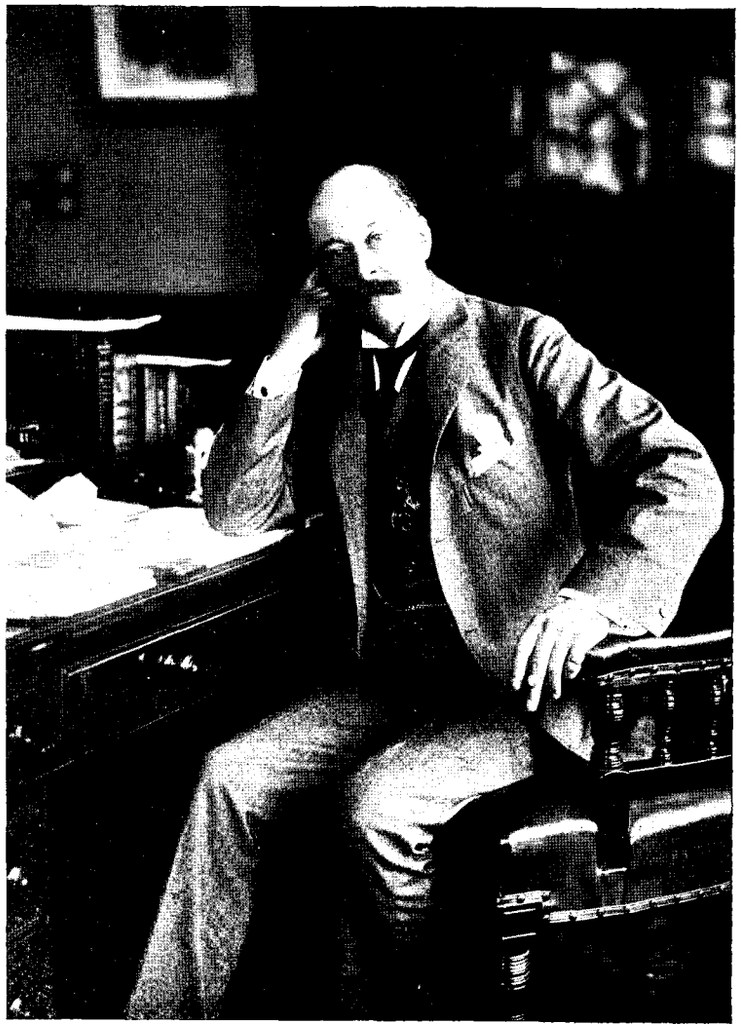
VOL. I. JUNE, 1906. No. 3.

TELEPHONE MEN.

I.—WILLIAM EDWARD LOUIS GAINE.

MR. GAINE was born in London in the year 1851. After leaving school he was articled to Mr. COMPTON SMITH, of 48, Lincoln's Inn Fields, where he served his articles, and was in due course admitted a Solicitor of the High Court. In 1875, at the age of 23, he was appointed Town Clerk of the County Borough of Blackburn, Lancashire (and subsequently Clerk of the Peace), an appointment which he held for seventeen years.



In the difficult and varied work of a Town Clerk Mr. GAINE, by his independence of spirit, his energy of action, his executive ability, and his wide and accurate knowledge of the laws relating to corporations, earned a high reputation among the best known municipal officers of the day, and when he left the Town Hall of Blackburn for the Headquarters of the National Telephone Company there were probably few Town Clerks in the country who were better known or more widely respected.

In 1892 the position of General Manager of the National Telephone Company was offered to Mr. GAINE, the then Board of the Company considering that in him they had found a man of the requisite administrative ability to organise and develop a business which even in those comparatively early days showed signs of expanding to very large proportions. At that time the National Company did not include quite all of the United Kingdom in the scope of its operations. There were also in existence the West of England and South Wales Telephone Company, the South of England Telephone Company, and the Telephone Company of Ireland. When Mr. GAINE became General Manager the National Company's system served about 46,000 subscribers' lines, and the staff numbered about 4,000 employees of all ranks. It now serves 377,883 stations, and the staff numbers nearly 16,000.

Soon after Mr. GAINE's appointment as General Manager, the National Company acquired the three companies named above. As a result of this amalgamation the Company covered the whole of the country, and something like uniformity of practice and methods began to be introduced. Rates were reduced in various parts of the country, and the service was improved, so that the public gained considerably by the amalgamation.

Mr. GAINE rapidly put into effect a definite scheme of organisation and administration, under which the Company has grown steadily and unceasingly. At the time he took the reins in hand there was practically no general organisation, each locality being a law unto itself, conducting the technical work as it thought best, and keeping its books and making its returns according to local ideas entirely. The variation among the local ideas of different districts of how things should be done was naturally prodigious. All this was changed by the working out of an organisation for the whole country, depending from the Head Office in London. The country was divided into provinces with a Superintendent at the head of each, who became, so to speak, the general manager of his province, but reporting to the General Manager in London. Each province was divided into districts under a District Manager, and each district into local centres. An Engineer-in-Chief was appointed, to undertake general control of technical matters, and engineering and electrical work began to be done along standard lines and according to standard specifications. A complete and uniform system of books and forms for all districts was brought into operation, and service instructions, aimed at producing uniformity of practice, began to be issued. On these scientific lines the foundations for the present great business were laid, and on these scientific lines it continues to be conducted and to expand.

Mr. GAINE's experience as a solicitor and as the Company's Solicitor as well as its General Manager has stood him in good stead in steering the Company through many tortuous and difficult negotiations with the Post Office, with Town Councils,

and through the periodical prolonged Parliamentary investigations which have been such a feature of the history of the telephone in this country. When we consider the numerous attacks that have been made on the Company's business—the absorption of the trunk lines, the various competition schemes, the municipal obstruction and competition—the wonder is that the Company is alive to-day, not that it is as powerful and prosperous as any industrial concern in the country. It is due in great measure to Mr. GAINE's skill as a negotiator, to his clear and forcible way of presenting the Company's case before Parliamentary Committees, as well as to his energetic and efficient administration of the daily business of our great concern that the Company has so far triumphed over all opposition and all obstruction.

Mr. GAINE is a telephone enthusiast, a demon for work, and untiring in his efforts to improve his knowledge of telephone affairs and to bring the best experience and ideas to bear on the improvement of the National system. He has on four occasions during the past seven years made extensive journeys in America, visiting a large number of American and Canadian cities for the purpose of acquiring telephonic information, of which on each occasion he has brought back large stores. He has also visited a number of the principal exchanges on the Continent, and probably few telephone men have a wider acquaintance in the telephone world.

Like most hard workers Mr. GAINE is a sportsman, during those few moments when affairs at Telephone House may be left to run themselves. He is fond of shooting and yachting, and the golf courses of Sunningdale, Sandwich, Richmond, and Deal know him well. Mr. GAINE is a member of the Incorporated Law Society and of the Institute of Electrical Engineers.

CORRESPONDENCE CLASSES, 1905-6.

WE publish below the names of and percentage of the total possible marks obtained by those members of the classes who have secured the first five places in each of the various courses.

"A" Course.

	Name.	District.	Per cent.
1st place ..	J. Burt	Bristol ..	99
	W. Gregory ..	,, ..	
	F. Spay ..	,, ..	
2nd ,, ..	F. Holden ..	Birmingham ..	98
3rd ,, ..	H. Herink ..	Norwich ..	97·5
4th ,, ..	A. A. Kester ..	Hull	97
	J. Morris ..	Chester ..	
	W. Satchwell ..	Manchester ..	
	J. Tullock ..	Chester.. ..	
5th ,, ..	S. Bennett ..	Bristol	96·5
	C. Sadler ..	Coventry ..	
	C. Slater ..	Hanley	

"B" Course.

1st place ..	A. Sutherland ..	Birkenhead ..	99·5
2nd ,, ..	R. Harrison ..	,, ..	99
	H. Smedley ..	,, ..	
3rd ,, ..	J. Johnson ..	,, ..	97·5
4th ,, ..	W. Goulden ..	Brighton ..	94·5
5th ,, ..	W. Crompton ..	Head Office ..	94

"C" Course.

1st place ..	G. Field ..	Cardiff ..	100
	F. Gresswell ..	Hanley ..	
	I. Schofield ..	,, ..	
	B. Smith ..	Bristol ..	
2nd ,, ..	L. Jones ..	Hanley ..	98
3rd ,, ..	H Bagshaw ..	Birkenhead ..	97
	J. O. Cooper ..	,, ..	
	J. Finlay ..	Cardiff ..	
	E. Graham ..	Dublin ..	
4th ,, ..	T. Hughes ..	Birmingham ..	96
	G. Price ..	Cardiff ..	
	S. Whetton ..	,, ..	
5th ,, ..	H. Lloyd ..	Birmingham ..	95
	P. Ridd ..	Metropolitan Maintenance Department. ..	

"M" Course

1st place ..	J. Curtis ..	Birkenhead ..	99·3
	J. Roberts ..	Middlesbrough ..	
	A. Sutherland ..	Birkenhead ..	
2nd ,, ..	T. Woodyatt ..	Hanley ..	98·9
3rd ,, ..	H. Cowles ..	Norwich ..	98·5
	H. Herink ..	,, ..	
	L. Shadforth ..	Middlesbrough	
4th ,, ..	H. Bishop ..	Head Office ..	98·1
	F. Whalley ..	Hanley ..	
	T. Gretton ..	,, ..	97·7

HOW A SUBSCRIBER MAY HELP HIS OWN SERVICE.

BY WINIFRED M. ETHEREDGE, *Avenue Exchange.*

THERE are many ways in which a subscriber may considerably aid the service; indeed, without the co-operation of the subscriber a thoroughly efficient service is impossible. The first, and by far the most important, step is the establishment of a friendly relation between himself and the operator. Unfortunately, the attitude of the majority of subscribers towards the operator is one of indifference. To him she is merely a part of the whole vast machinery for the use of which he pays so much a year. If that machinery does not work quite as smoothly as he would wish, the operator is by far the easiest portion to blame. He overlooks the fact that an unskilled hand can throw even the most perfect machinery out of gear.

Others, again, think that incessant fault finding and grumbling are quite atoned for by an occasional lapse into familiarity—often far more offensive to the operator than any abuse. A diet of sour vinegar and sugar plums would ruin the best of digestions, and moral indigestion has much the same results as its physical prototype—irritability and lack of interest.

But, if a subscriber desires his service to be as perfect as machinery, brains, and energy can make it, he must understand that it is to the operator's advantage, as well as his own, for his service to be efficient, and he must exhibit towards her the businesslike politeness, consideration, and confidence which he would use towards those in his own office if he wished to get any satisfactory work from them. Nothing is so conducive to indifferent work as distrust. And anyone who knows anything at all of the working of an exchange, knows how quick an operator is to respond to any sign of confidence in her on the part of a subscriber.

It would be well if every new subscriber could pay a visit to an exchange to gain some insight into the working. He would not then be led into believing that his troubles were due to the laziness and indifference of the operator, and make statements to that effect, in ignorance of the facts of the case. As long as subscribers insist on having about half the number of telephones their service requires, so will numbers be engaged, and as long as they leave their instruments to the care of office boys who know little about them—and care less—so will difficulties occur. And the sooner a subscriber understands these facts, the better for his service.

"I can't help your troubles. I pay for a good service, and you ought to let me have it," say some when the operator tries to explain some difficulty caused by junctions being engaged, lines out of order, congestion of traffic, etc. And others refuse to hear any explanation whatever. It is so much easier to put it down to obstinacy or spite on the part of the operator, for it is an indisputable fact—strange, but none the less true—that men who in their ordinary business relations are models of common sense, politeness, and good temper, when they come to the telephone are unreasonable, impatient, and sometimes even abusive.

Let the subscriber treat the operator not as a mere machine, but as a human being, and he will understand that attention to his service is just as much her profession as his own particular business is his.

Once a friendly, businesslike relation is established, the subscriber is a long way on the road towards a satisfactory service.

Then, a second way in which he may facilitate the service is by being observant of what goes on when he makes a call, and taking heed of any hints offered by the operator. A subscriber who exercises a little observation will in a very short time be able to understand by the sounds in his receiver a great deal of what is taking place. It does not require very great intelligence to notice that the hum of the "busyback" is invariably followed by the reply "Number engaged," yet it is surprising the number of subscribers—and subscribers of long standing, too—who profess complete ignorance of the meaning of the "hooter," or "buzzer," as they call it.

Thirdly, attention to such details as ringing off when finished,

replacing receiver properly, not interrupting when the operator is speaking on the call-wire, not indulging in unnecessarily prolonged ringing, all tend to promote smooth working. A violent ring in his ear would probably lead a man to use expressions more forcible than polite, but how many think of the operator with her receiver fastened to her ear when they viciously turn the handle a dozen times, and then shout as if she were miles away?

"But these are only trifles," says the subscriber. Yes, but, in the words of Michael Angelo—if art and telephony may be referred to in one breath—"trifles make perfection, and perfection is no trifle."

In short, if the subscriber will remember that the operator is ready and willing to do her best for him, and will at the same time take care that no cause for difficulty comes from his end of the wire, complaints of the telephone service will disappear.

TELEPHONE LOSSES IN THE SAN FRANCISCO FIRE.

THE *Electrical World*, of New York, of May 12, in an article on "Damage to Electrical Interests in San Francisco," gives the following brief account of the damage to the telephone system from the great fire which followed the earthquake of April 17:—

> "Although the loss to the telephone system is great enough, it is not as large as the public was led to suppose at first. General Manager Glass announced that the losses, as far as they can estimate them, are approximately $1,800,000, against which an insurance of $1,060,000 was carried.
>
> "The entire underground system is practically intact, which fact will simplify in a great measure the restoration of the telephone service throughout the city. The lateral cables, where they entered the blocks, were burned off, and forces of men are now at work cutting off these laterals in the manholes and soldering them up to keep out moisture. In regard to the condition of the Sunset Telephone and Telegraph Company, General Manager Glass says: 'We have lost, so far as we can estimate, about 33,000 subscribers out of 52,000. We lost six operating buildings, in addition to our main executive building on New Montgomery Street.
>
> "'All our outside systems, including our long distance lines, were unaffected by the earthquake, and since we restored connections through the burned district, we have handled more long distance telephone business than ever. We have been doing a tremendous business. The fire seems to have created a boom in telephoning.'"

The following dramatic account of a struggle with the fire at the Western Electric building in San Francisco is from a report to the Western Electric Head Office, which is published in the Philadelphia *Telephone News* for May 11:—

> "The fire reached the immediate vicinity of our building at 7 a.m., Wednesday, the first day of the disaster, and raged there until 5.30 p.m.
>
> "The Fire Department were on the ground and made a splendid struggle to keep the fire from the neighbouring frame buildings, but when it was clearly evident that these were going, and the flames were sweeping against two sides of our building, they abandoned both the buildings and their fire engines and left. A force of our men, who were on the ground, consisting of Mr. Weyman and Mr. Schneider, of the Supply Sales Department; Mr. Casey, the head janitor, and two or three of his assistants; the night watchman, Mr. Van Valkenburgh; Mr. Muller, the Chief Clerk; Mr. Caven, our editor; Mr. Crilly, of the Purchasing Department; Mr. Stephton, of the Construction Department; Mr. Armstrong, of the shop, and a number of our general force (names unknown) decided to remain and continue the fight. Owing to the fact that the city water supply was exhausted, the firemen were disheartened and completely worn out. They finally got a crew of them together and dragged the abandoned engine into the yard over the reservoir. After the hotel next to us was about half burned, they gave up the fight and took the engine out of the yard. From there on the blaze was fought from the roof with fire extinguishers and water that was carried up in buckets, the water in the roof tank having become exhausted early in the day. The men referred to above were divided into small parties, one party to each floor and the roof. All window blinds were torn down and combustible material in the vicinity of the windows removed. The roof of the drafting room, on the top floor, caught fire and fell in, but the fire was extinguished, and the blue prints safely removed to the vaults below.
>
> "Fire also crept round the edges of the iron doors on the shipping platforms and burned the wooden door frames inside, but was extinguished with buckets of water. The brick cornice at the top of the building began to fall during an early shock, leaving the woodwork exposed, and this caught fire frequently, but they always succeeded in putting it out.
>
> "The wire glass was of the greatest service in saving the building, as on two sides of the building it was in direct contact with the flames; but, while it is broken into small pieces, it is still in place.
>
> "The heat inside was intense, the desks blistered and charred, and smoke coming from the window blinds before they were pulled down.
>
> "Late in the afternoon the fire swept on, seizing on frame residences opposite our building on Folson Street, and continued on its way, leaving our building the only one standing for blocks in every direction."

A LIGHTNING STROKE.

BY A. D. PIKE.

THE accompanying illustration shows the effect of a lightning stroke, and incidentally that a National employee had a remarkable escape.

Two men, a foreman and wireman, were working near Cheltenham, on a 50-ft. pole, when a vivid flash of lightning struck both, rendering the wireman unconscious; only the fact that he had a life-line securely fastened saved him from being dashed to the ground. He was lowered at once by means of ropes. The foreman received nothing more than a slight shock on the arm, and was able to resume work immediately. The other was severely burnt about the head and chest, and at first was not expected to recover. I am pleased to say, however, that he pulled through, and is now at work again. The photo shows how the lightning cut the cap to ribbons, and gives some idea of the force of the shock. The curious feature is that no burns are visible; the cloth looks as though it has been cut with a sharp knife.

STUDY OF TELEPHONIC SPEECH TRANSMISSION.

By B. S. COHEN.

(*Continued from page* 25.)

Apparatus for Transmission Tests.—I will now proceed to describe some of the apparatus used in connection with transmission tests in the Telephone House laboratory.

In order to make transmission tests it is necessary to have the following reproducible standards:—

(*a*) A pair of telephone instruments for transmitting and receiving.

(*b*) A standard telephone circuit.

(*c*) A standard line.

Having obtained these essentials it is still necessary to have a sound producer for transmitting, and a sound measurer for receiving.

For a final or check test the sound producer used is almost invariably the voice, and the sound measurer will be the ear. But these are nowadays supplemented by some very useful instruments which I will describe.

One form is a motor-driven interrupter, which makes and breaks a battery circuit either 100, 800, or 2,400 times per second. This interrupted battery circuit is passed through a receiver, and this will give a howl of which the intensity depends on the strength of the battery current. The receiver is fixed opposite the transmitter which it is desired to actuate. Another form of sound producer used is a small alternator, which produces a sine-shaped wave of about 800 ~, and it is hoped that by the use of this instrument quite a number of important transmission questions will be solved.

Now coming to Transmission Measurers.—To supplement the results obtained by using the ear, two very useful instruments are being employed.

The first is the oscillograph.

Fig. 6 illustrates the principle on which this instrument works.

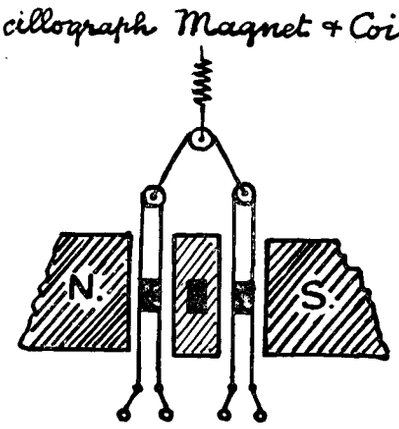


FIG. 6.

Between the poles of a very powerful magnet, N. S., is fixed a piece of soft iron, so that a very intense magnetic field exists in the two narrow gaps thus formed. In each narrow gap are stretched two parallel conductors of phosphor bronze, bent round a small ivory pulley. The tension is maintained and adjusted by means of a miniature spring balance. The clearance between the sides of the gap and the moving strips is only ·038 m.m., and the gaps are filled with a damping oil, which varies in viscosity (and, in consequence, in damping effect) with the temperature.

The front of the gaps is closed in by a glass lens. Three minute mirrors are fastened, one on each strip, and one fixed to the centre pole piece to form a zero line. The two strips work quite independently of one another. The instrument thus forms practically two D'Arsonval galvanometers of very high frequency. The period of vibration of the instrument used by the Company is only $\frac{1}{10000}$th of a second.

The heat generated by the exciting current for the field magnet is used to vary the damping effect of the oil, and a small thermometer is fixed into the pole pieces to measure the temperature.

Fig. 7 shows how the oscillograph is arranged.

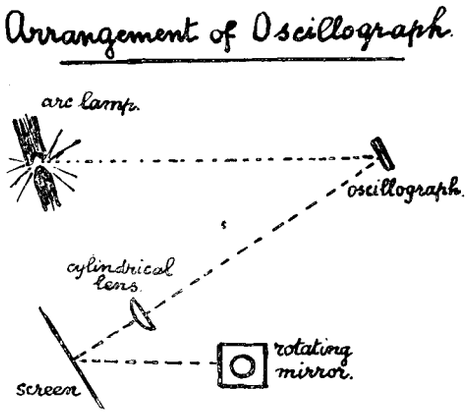


FIG. 7.

A powerful beam of light from an arc lamp falls on the oscillograph mirrors and is reflected as three slits of light on to a cylindrical lens, which converts the three slits into three spots which fall on a screen. The three spots can be made to coincide by a delicate adjustment on the oscillograph.

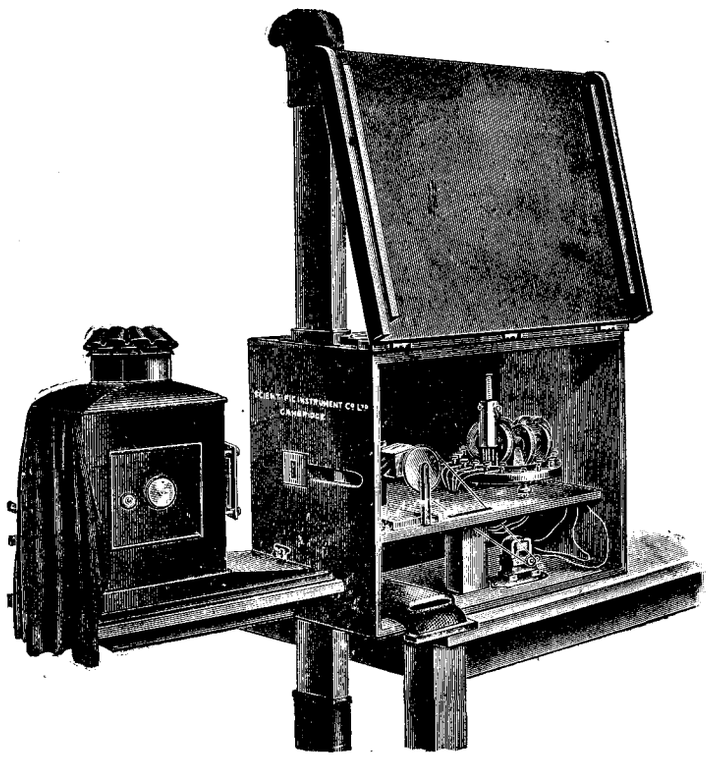


FIG. 8.—Falling plate photographic and visual outfits

Now if an alternating current passes round one of the strips the mirror is vibrated to and fro and the spot of light is spread out into a line of light on the screen. If the reflection of this line is viewed in the rotating mirror, which is revolved at right angles to the motion of the oscillograph mirror (by means of a motor), an image of the actual waves is seen.

By means of a special device, a photographic plate can be released at any moment, and this falls in front of the screen and thus takes a permanent record of the waves.

Fig. 8 shows a complete view of the whole instrument.

Some of the results obtained with this instrument will be referred to later on.

Another instrument used to measure telephone currents will now be described. This is the Thermal galvanometer, invented by

Mr. DUDDELL, who also invented the oscillograph. The principle on which this instrument works is quite simple.

Fig. 9 shows this. Between the poles of a powerful permanent

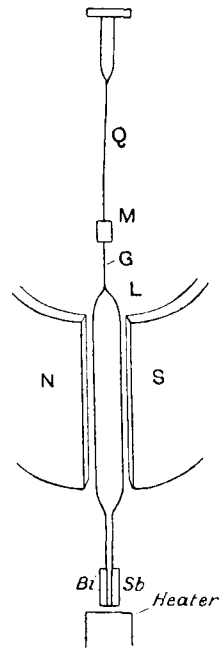


Fig.

FIG. 9.

magnet, N. S., is suspended by a quartz fibre Q, and glass stem G, carrying a mirror M, a fine silver loop L forming the moving coil of a D'Arsonval galvanometer. The lower end of this loop consists of two little rods, one of antimony Sb and the other of bismuth Bi.

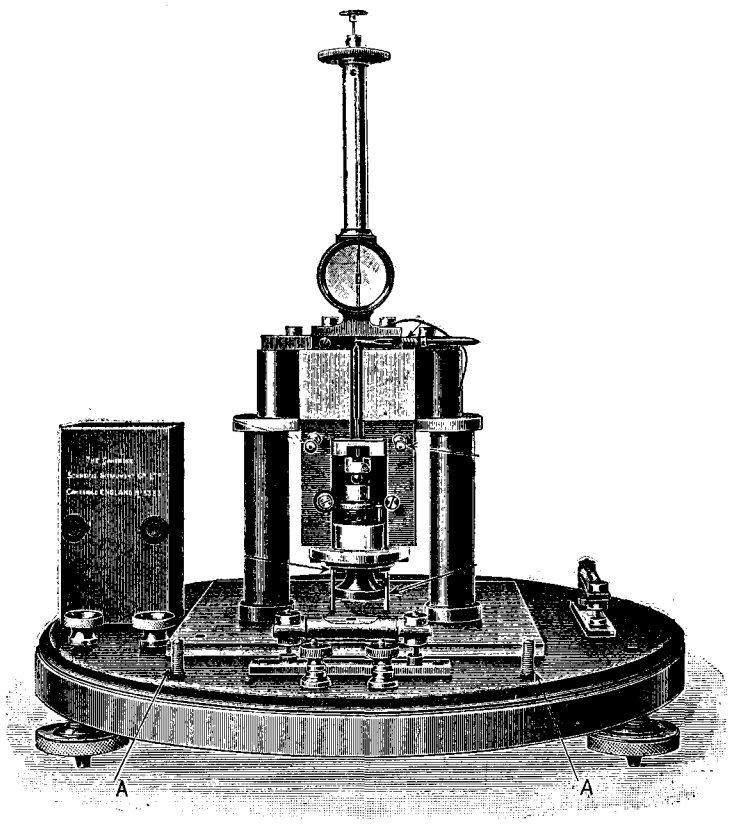


FIG. 10.

soldered together at the bottom, thus forming a thermo-couple. Below the joint comes a piece of apparatus called the heater. This consists of an extremely fine piece of platinum tube, which, although of short length, has a resistance of 100 ohms. The ends of this heater are brought out to terminals, and form the only external connections to the galvanometer. Any minute currents flowing through this heater raises its temperature, and, consequently, sets up a current in the thermo-couple, which, circulating in the silver loop, deflects the latter in the magnetic field.

This instrument is very nearly as sensitive as the telephone receiver, and gives its readings in R.M.S. values of the currents flowing, being quite independent of the wave form and frequency.

Fig. 10 shows the complete instrument.

(To be continued.)

THE NATIONAL TELEPHONE STAMP.

BY C. J. MILLAR.

IT is a far cry between telephony and philately, but readers of the JOURNAL may be interested to know a little about the stamp issued by the Company in 1884 for use at its call offices.

I am unaware whether these stamps were ever used in England, but they had a considerable vogue in the Land of the Thistle. They were engraved by the well-known Glasgow firm of MACLURE, MACDONALD & Co., and there were in all six different issues, viz.:—

Value.			Colour.
1*d.*	...	...	Black.
3*d.*	...	...	Dull red.
4*d.*	...	...	Blue.
6*d.*	...	..	Olive green.
6*d.*	...	...	Myrtle green.
1*s.*	...	...	Brown.

The frame of the stamp was different in each value, and enclosed, as the above reproduction shows, an excellent likeness of Colonel R. RAYNSFORD JACKSON, at one time Vice-President of the Company.

The issue was withdrawn from use in 1891 at the request of the Postmaster-General of the day, and the result is that if a subscriber or anybody else nowadays wants to buy one of our old 1*d.* stamps (unused), he has got to pay, according to the foremost philatelic authority in the Kingdom, something like half-a-sovereign for it.

HUMOURS OF WAYLEAVE GRANTORS

THE following complaint was recently received by the Guildford District Manager from a wayleave grantor, referring to the weather-vane fitted to the pole in his garden. "Our weather-cock has just moulted and thrown off his wings and tail, and therefore is unable to breast the current. Kindly tack on his lost appendages so that he may again play the part of a true and good weather prophet."

WHITSUNTIDE HOLIDAYS.

THE London and North-Western Railway Company announce that the Ticket Offices at Euston, Broad Street, Victoria (Pimlico), Kensington, and Willesden Junction, will be open throughout the day, from Monday, May 28, to Monday, June 4, inclusive, so that passengers wishing to obtain tickets can do so at any time of the day prior to the starting of the trains, and so avoid delay at the stat ons. Tickets, dated to suit the convenience of passengers, can also be obtained at any time (Sundays and Bank Holidays excepted) at the Town Receiving Offices of the Company. Additional express trains will be run, and special arrangements made in connection with passenger trains for the Whitsuntide Holidays. Tourist tickets are now issued daily to Scotland, North, South, and Central Wales, Cambrian Line Stations, Ireland, Blackpool, Southport, Morecambe, Windermere, Grange, Ulverston, the English Lake District, Leamington, Buxton, Malvern, Scarborough, and other seaside and inland watering places. Week-end tickets will be issued on Friday and Saturday, June 1 and 2, and will be available for the return journey up to the following Wednesday instead of Tuesday as usual. The Company have also arranged a very full programme of cheap excursions for the holidays, comprising bookings to all the principal points of interest in the three kingdoms.

THE ELEMENTS OF A GOOD SERVICE.

BY H. G. CORNER.

(*Continued from page* 41.)

Having thus by records and observation decided what we have got and what we want, there remains the all important question of how to get it, and I am afraid I have left myself very little time to deal with this, but I should say briefly that by far the most important need at the present time and almost the only hope of improvement is in the education of the whole operating force, from the Clerk-in-Charge down to the newest operator.

The duties of the Clerk-in-Charge have been considerably modified, and at first sight appear to have been much lessened by the introduction of team working. Previous to this a great part of her time was taken up in arranging luncheon and tea times and seeing that positions were adequately filled at those times, which was a matter generally requiring some care and thought. Indeed, in large exchanges it is hardly too much to say that the Clerk-in-Charge did very little else beyond that and communicating with the Matron and district office *re* absentees, illness, &c. It is obvious that an efficient worker is capable of much better and more useful work than this.

The introduction of team working set her free for more useful duties, and the service should show a marked improvement in consequence thereof. Does it?

The new code of rules lays down the following regulations :—

"The Clerk-in-Charge is responsible for the operating at the switchboard and for the discipline of the entire operating staff.

"She is to have no routine duty, but is the executive head of the operating staff and will attend to all ordinary matters of discipline, special cases only being referred to the Exchange Manager for his personal attention."

That is all, and compared with the manifold instructions to operators, supervisors, and Exchange Managers, it seems quite insignificant. Nothing, however, could be farther from the truth. The first two lines alone, properly interpreted and conscientiously carried out, furnish sufficient material to fill up a full day's work and more. That is why the next line says "She is to have no routine duty."

I am afraid some Clerks-in-Charge do not fully appreciate the responsibilities and possibilities of their position. In the old days the most outstanding feature in the life of the exchange was the complaints, written and verbal, the dealing with them, the answering of reports, classifying and counting them. Hence it comes to be looked upon as the most important part of the duty of the exchange officials to deal with complaints and to trace the operators at fault. This is fundamentally wrong. The first duty of the exchange official is to *prevent* complaints and hence to cultivate a good service, and if the machinery for dealing with complaints and for enabling the officials to trace calls and operators responsible, etc., is a hindrance to a good service, if it is any sort of a drag upon the operating or on the supervision, *it must go.*

Do the Clerks-in-Charge and supervisors realise this? Perhaps not in all cases, and from this can be traced the origin of the opposition, almost universal among Clerks-in-Charge and supervisors to two of the most important reforms of recent days, viz, the introduction of the monitor's table and the partial abolition of the operator's pad. A consideration of these two matters from the proper point of view ought to convince the most conservative of the soundness of the principle on which they are based. The generally expressed objection to the monitor's table was that it prevented supervisors from taking up and looking into subscribers' complaints themselves, but the justification of it lies in the fact that it leaves the supervisor free to exert all her powers in preventing and forestalling these complaints, and, if it has not had this effect, the fault lies in the supervision and not in the principle of the table. And with regard to operators' pads it was felt that the relaxing of the rule which at one time existed to record all calls, and later on, to record all ineffective calls, would mean the impossibility of tracing calls on which there had been trouble. But surely the accumulation of labour necessary to carry this out must have been far in excess of any good result achieved.

And here we have the principle on the basis of which all labour in the switchroom should be regarded, viz.—are the good results achieved commensurate with the labour involved? If the answer is "No" then that labour must cease.

What is then required of the Clerk-in-Charge? The answer is two words—study and education. A study of the service, its requirements, its weak points, and its improvement, and education of the operators, the supervisors, the monitors, and the subscribers.

I have already stated that the requirements of the service are threefold—speed, accuracy and politeness. Perhaps the last should come first, but it may safely be assumed that all are equally important. When the Clerk-in-Charge begins to study these she soon finds out the weak points. Constant supervision will show her which operators are not practising team work; and she must give attention to small details which save seconds or fractions of a second and in the aggregate make all the difference between quickness and slowness, such details for example, as not plugging up before being ready to answer, having a plug ready to answer any calls on her own or neighbouring positions, using both hands to switch with, one for the cord and one for the key and so on. Accuracy is insured by careful articulation, correct call-wire working, not breaking in and not shouting, and a careful selection and testing of the jack before plugging in. Politeness consists more in the tone than in the actual spoken words, and any departure from uniform courtesy and patience must be firmly and promptly checked. Having thus found out the weak points in the service, but not before, it is possible to set about improvement. This is to be attained by constant and resolute insistance on the above points, first with the supervisors and, if necessary, with the operators themselves. Every weakness or irregularity discovered must be pointed out to the supervisor, and she is responsible for improving matters. But it will be found that personal supervision, though highly useful, will not do everything; the best results are only to be obtained by a methodical system of listening. Every supervisor's duties should be so arranged that she can spend a certain number of minutes each day in listening and coaching. Coaching, which means listening and watching and teaching at the operator's own board, is only necessary in the case of recently transferred learners, and can soon be abandoned unless the operator is so helpless that the retention of her services is impossible, but listening should take place regularly on all A and B positions and outgoing call wires, and all irregularities must be carefully noted, taken up with the operator and the record preserved.

It must by no means be forgotten that the B operators must be as carefully educated and watched as the A operators; accuracy, quietness, and invariable good temper being the chief virtues that must be inculcated in their case. It is important to note that here the Clerk-in-Charge of one exchange can render important assistance to the officials of another, for the work of the B operators can be better judged by the distant exchange than by her own, and as call-wire working is the key of the whole service every Clerk-in-Charge and Exchange Manager should be on the alert to report immediately any falling away from the three requirements enumerated above.

The education of the supervisor is a matter of the highest moment. She must be actuated by the same zeal for the service as the Clerk-in-Charge and Exchange Manager. The points in which her team compares unfavourably with others must be indicated to her, and above all, it must be impressed upon her that slackness in a supervisor is all too surely imparted to her team. There remains, too, an extensive field for the labour of the Clerk-in-Charge and Exchange Manager in training monitors. Many of these do not seem to realise that their main business is to satisfy subscribers and not to argue with them. The monitor must be made to see that she stands for the Company, from the General Manager down to the Exchange Manager, and from her demeanour and attitude the public will judge of the attitude of the Company. Many monitors make a most unfortunate impression by taking up complaints in a peevish or perfunctory tone, quite unnecessarily contradicting subscribers with a lamentable want of tact. In this position above all is an even temper requisite. The education of the subscriber should also be guided by the Clerk-in-Charge. She must see that he observes the rules and speaks to the operators in

a proper manner, and that he uses the instrument in an effective manner.

It only remains to add a word on the proper method of taking up the points. Where the real worth of the Clerk-in-Charge will be most clearly shown and the whole tone and discipline of the exchange made manifest will be in the manner in which failings are pointed out to the operators and corrected. It is difficult to hit on the just mean between leniency and undue severity, but it must be the aim of the Clerk-in-Charge to do this and her value will be measured by her success. Slackness in any direction will never produce efficiency, still less will constant nagging, and the supervisor who cannot preserve an equable temper and a just sense of proportion in taking up irregularities is totally unfitted for the position. It is in these personal matters perhaps that the influence of the Clerk-in-Charge can be most profitably exerted. Her whole aim should be to inspire the operator with confidence in herself, confidence that no irregularity will be tolerated and that the Clerk-in-Charge will protect them from any injustice on the part of the Company's officials on the one hand and abuse or inconsiderateness on the part of the subscriber on the other.

WANTED: AN INSULATOR TO MATCH ITS SURROUNDINGS.

BY J. STUART BEST, *Local Manager, Weybridge.*

BEFORE dealing with my subject, I would like to say that it is with great pleasure I welcome the JOURNAL, which, for a first number, is splendid. It has been needed for years and will—if carried out in a liberal spirit—fill a want in the service that many of us older staff have long felt; that is, a means of comparing notes on the work and making suggestions, which latter I am about to do if I may.

Many a Local Manager or engineer must at times have felt the need of an insulator that would not be so conspicuous as the standard white stock list article, especially when running over private grounds.

I am at the present moment in negotiation for wayleaves with a gentleman who absolutely refuses to have "any of those horrid white cups" put on his property, but would grant permission for poles painted green, fitted with green or grey insulators, to tone with his beech trees.

I do not know whether the insulating properties of white glaze porcelain are higher than if a coloured material were used; but, granting that they were as efficient, I think it would be well worth while to stock insulators in neutral, green, or mottled grey shades, and also in red to match brickwork for spurs.

The S.A. spur cup is another offender in the eyes of many people, which is a pity, as it is a most useful pattern, but might it not be made on more graceful lines, more like the S.I. spur and with a larger wire grove than at present? Here again dark colours to match brick and stonework would be an advantage, as "two large white objects" are not, strange to say, considered an improvement to a building when fitted close to a door or window at a short distance from the ground.

Only in one case have I had a subscriber express pleasure in having them, and he wanted everyone to know he was coming on the telephone, so that the more show we made of his wires the better.

I have no doubt that the staff in cities and in the north, where they have hard-headed and unsentimental business men to deal with, to whom the telephone is a necessity, will smile at my suggestions. I should have done so myself before I came south, to a district where the residents look upon it as a luxury, which is scarcely worth having at the cost of unsightly attachments and poles on their property, and will hardly allow overhead wires to be run for their own use, much less that of their neighbours.

In cases like these anything that will render the plant less objectionable will be a boon to many a Local Manager.

A FEATHER SHOWS.....

EXTRACT from a canvasser's report at Glasgow. Result of call on an undertaker who is a "Corporation" subscriber. "Says 'Corporation' O.K. —won't change; and that everybody requiring burial have 'Corporation.'"

CABLE REPLACEMENT IN LONDON.

THE details of certain work carried out in Liverpool, given in the previous issues of the JOURNAL, have doubtless aroused a considerable amount of interest amongst engineers who have to meet the difficulties of such work, and as the work is to a large extent a new development of our underground problems, engineers and others concerned will appreciate the points brought out in the Liverpool case. The engineers of that district are certainly to be congratulated on the effective way in which the work was carried out, with so little interruption to the service.

It will be generally admitted that in replacing existing cables by new ones containing a larger number of wires, the chief problem to be solved is to arrive at the method which will cause the minimum interference to the service. The ideal would be to effect the substitution with no interference at all. This can be done by transferring the working circuits into a spare cable if one is available, but as such cases will be rare, it would generally be necessary —for no interruption—to provide what is miscalled an interruption cable. This at first sight would appear to be the proper method, but as it must necessarily be very costly, it becomes a question as to which is the most serious—the inconvenience of stopping the service of certain subscribers for a few hours, or the heavy expenditure involved in providing an emergency cable.

In London it has in most cases been thought best to take the risk of the first of these two alternatives, and advantage was taken of the Easter holidays in the south-eastern division of London, to carry out the replacement of an underground cable between Deptford and Charlton, through Greenwich, a length about two and a half miles.

The cable to be replaced consisted of—

2,751 yards	... ...	152 pair.
1,467 „	... ...	102 „

2 miles 698 yards, with 6 D.P's.,

and the new cable drawn in was—

524 yards	... ...	600 pair.
1,730 „	... ...	500 „
1,500 „	... ...	357 „
545 „	... ...	306 „

Total 2 miles 779 yards.

All preparations possible were made before the actual day of cutting out, the old cable being opened and numbered at the points necessary.

The service was cut at 1 a.m., on Good Friday, April 13, and the drawing out began at 3 a.m. The drawing in of the whole length of new cable was completed by 11.30 p.m. the same day. The jointing of 48 joints was sufficiently advanced to restore the service at 12 noon on Saturday, April 14. The successful replacement of a cable of such a length at one operation is dependent on the organisation of men and tools, the following are a few details showing what was required in these directions. There were in use:—

18 winches,
21 cable grips,
2,740 yards rope,
15 jacks,
240 road lamps,
6 sets dry air pumping apparatus,
1,740 feet pipe rods.

The drawing out and in was done entirely by hand labour; it was not considered practicable, from the nature of the route and the heavy traffic, tramway and other, to use either horse or motor haulage.

There were 260 men employed in the drawing out and in and drumming up. Thus the number of man-hours per yard of cable dealt with was 0·62.

The gathering of the cable drums and other material and tackle and the distribution of them in temporary storages along the route involved considerable forethought and labour, and Mr. APPLEBY, the divisional engineer, and his assistant engineers are certainly to be commended for the satisfactory way in which they arranged and carried out the operations.

NOTTINGHAM (COMMON BATTERY) EXCHANGE.

NOTTINGHAM EXCHANGE.

THE Nottingham switchroom, shown in the accompanying illustration, is in the Company's own building, and was brought into use in the summer of 1901. The switchboard was fitted with lamp signals giving automatic calling and clearing, but not at first for common battery speaking from subscribers' instruments.

The keyboard circuits were modified in 1904, and the system is now working standard common battery.

The multiple capacity is 6,400 and the board is at present equipped for 3,100 lines. Some 2,675 lines are working, and an extension of the board is in view.

The operating staff consists of 29 operators with three supervisors, and one lady clerk-in-charge.

SUBSTITUTION OF CABLES AT LIVERPOOL.

THE figures given on page 44 of the May number should have been (*a*) ·2*d.* per yard, (*b*) ·1*d.* per yard, instead of 2*d.* per yard and 1*d.* per yard as shown.

THE WAYLEAVE CANVASSER AND THE PUBLIC.

BY T. W. JACKSON.

THE wayleave officer sees, in the course of his duties, life in varied phases and meets with many sorts and condition of men; and in his zealous attempts to wrest from the British public all that he desires in the way of concessions he is perhaps to be compared, at least on some occasions, to the guardian of the law, whose lot has been described in song as being "not a happy one." Each district has its own peculiar difficulties, according to the peculiarities of human nature met with; nor is it always one's fellow beings only who have to be reckoned with, there are dogs and other objectionable obstacles to be swept aside.

Thrilling tales might be told of the experiences of wayleave explorers with too watchful house dogs, bent on aggressive action against any stranger.

No less unpleasant from another point of view is the human specimen who, after hearing the purport of your visit, threatens to throw you down the steps or expresses some other delicate intention towards your person. This calls to mind the visits of a wayleave officer to a prospective grantor, when such alluring prospects were held out to him. A flat, and anything but encouraging, refusal was the result of the first call, and a like fate awaited him at a second one; but as he found it to be impossible to get the line through in any other direction he paid a further visit to this well-wisher; then the "fun" waxed fast and furious, and the above elegant expressions as to ejection were indulged in. Nothing daunted, however, the officer, with that tenacity of purpose which characterises him, returned, after a judicious interval of time, once more to the charge. Astonishment at such audacity then so overcame the importuned one, that in tones in keeping with his altered feelings, he exclaimed: "Well! for your —— cheek, I'll give you what you want"; and he signed the wayleave.

Occasionally this strange reluctance on the part of the public to recognise your claim to a partial use of their property, may be overcome by methods in which music takes a place. In one case a market gardener was approached with the object of wheedling from him (for a consideration) a much-valued foot or two of his ground in which to plant a pole. The officer thought plenty of its advantages, but the occupier apparently thought more, for he refused to lend an ear to the wiles of the canvasser and continued impervious to his blandishments, which were exercised both in office hours and out of them. The latter then determined to play his trump card. Presenting himself one evening at the gardener's house, and being asked why he had come there again, he assumed his most insinuating manner and replied that he had come to give them a song. This seemed to appeal to the household generally, for he was ushered in, and song after song he gave them, to such good effect that on taking his leave he ventured on the subject of the pole, and remarked in a quite bold manner, "Well, we'll be coming in the morning to put up that po'e," "Right you are, my boy," replied the worthy gardener, "You are a good sort; certainly you can stick the pole up," and he wrung his hand at parting with the warmth of a bosom friend.

One comes across people who have very hazy notions of what is required of them when solicited for a permit. For instance, an eminent member of the Company's establishment recounts that on a certain occasion he called on a shopkeeper in the grocery line and requested to be allowed to put a wire on his chimney stack. Here was no beseeching necessary, or pleading. No, quite the contrary, for after a brief conversation the grocer reached up to his stock of preserves and took down a jar, of the regulation pattern with a groove round the top; this he offered to the caller, remarking that he could have it to fasten the wire to, apparently thinking that something of the sort was supposed to be supplied by him and that such an article would answer the purpose. Needless to say this was declined with thanks, with the explanation that he was not asked to supply the material, but that the Company would be content with his permit only.

A touch of humour has sometimes its advantages when seeking to overcome objections raised to wayleave granting. An officer interviewed a lady whose permission was essential for a pole to be fixed in her garden. She would not hear of it; no, she was sure it would spoil the view from the windows. All persuasion failed, persuasion, we may say, of the highest order; the case seemed hopeless. The lady repeated her protestations in the matter of interference with the view. The canvasser was equally obdurate and tried a last card in jocular mood. "Madam" said he, "I really think you are altogether under a misapprehension, the pole could hardly spoil the *vista*. Consider how, for instance, in wishing to survey the prospect from the window, you will be able to divide the scene; you can first take the view on one side of the pole, and when tired of that can turn to the other side." This fortunately appealed to the lady's sense of humour, for she withdrew her objections, and the officer came away with the desired grant.

One's best hopes may, on the other hand, be rudely shattered by untoward happenings and short-tempered humanity. On a well-remembered occasion when a wayleave canvasser was making overtures for consent to a pole, and had succeeded so far as to induce the gentleman of the house to visit the ground with him to select the site, the two were passing through the house to reach the garden, when the occupant discovered that during his temporary absence the telephone (which had been left by the former tenant and which the new one had some idea of retaining) by some mischance had been removed by the Company, as he expressed it "when his back was turned, and without asking his permission to enter the house" (the domestic had allowed the electrician admittance). His wrath at this was great, and was promptly visited on the unoffending wayleave man, who was immediately ordered off the premises *without* the much-wished-for permit.

Still, there is the proverbial silver lining to the cloud, for are there not instances where the wayleave is graciously given and even light refreshment is placed before the seeker of positions, who departs not only with chest expanded with legitimate sense of duty done, but also with a satisfied feeling in the region of the belt. Of course, as the natural inclination is to refuse such an offer, the kindly act is accepted simply by way of a graceful acknowledgment of the Company's indebtedness.

POST OFFICE FEES.

BY J. W. CAMPION.

IT may be of interest to note the rapid increase in the business over the trunk lines and in the receipts from telegrams transmitted by telephone during the past seven years, as shown by the following figures :—

Year to 31st Dec.		Trunk Fees. £		Telegrams by Telephone. £
1899	...	172,241	...	37,827
1900	...	187,409	...	45,967
1901	...	213,812	...	53,736
1902	...	233,470	...	62,030
1903	...	269,349	...	69,985
1904	...	314,032	...	78,696
1905	...	359,670	...	92,947

Each month a large amount of detail work is involved in dealing with the accounts rendered to the Secretary's office by the Post Office Department and with the information supplied from the districts on Form No. 208, all of which have to be brought into agreement before the payment can be made to the Post Office, and the several amounts allocated to the various cash centres throughout the country. To effect this agreement it is necessary to check on an average 2,000 totals per month, covering revenue derived from upwards of 300 trunk centres and 1,000 post offices; any differences then have to be inquired into.

When the discrepancies have been settled, the amounts referring to each centre in respect of trunk calls and telegrams are entered on separate sheets for the commission to be calculated, viz., 5 per cent. on trunk receipts, 5 per cent. on inland telegrams, and 5 per cent. on foreign messages valued at 6*d*. each.

These figures having been agreed in the aggregate with the totals which appear in the Post Office account, the debit and credit notes are prepared for despatch to the districts.

POLICE AND FIRE-ALARM SYSTEMS IN EDINBURGH.

THE recent decision of the Edinburgh Corporation to distribute throughout the city a second series of 24 police signal boxes is the immediate outcome of an interesting report by the Chief Constable. The report states that "from a police point of view the system has proved of inestimable value in dealing with the various branches of work connected with police administration. Since its inauguration in October, 1904, over 2,000 messages have been transmitted through the signal boxes. Anything which tends to greater efficiency in the administration of police affairs cannot but be highly beneficial to the public."

The latest instance of the utility of the fire-alarm service was recorded on April 11. About 7.30 in the evening of that day, a carter engaged at the cooperage of Messrs. Wm. Lindsay & Son, Glenogle Road, noticed flames issuing from the cooper's workshop, a substantial two-storey building, the lower flat of which served as a store for cooperage material, the upper for oil, oak staves, etc. The Fire Brigades were immediately summoned by the Canonmills Street fire alarm, and did not arrive too soon, only succeeding in time in averting the spread of the fire to the valuable stacks of wood which surrounded the building.

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"BY THE STAFF FOR THE STAFF."

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THE ANNUAL MEETING OF OFFICERS.

The annual meeting of the Company's senior officers, culminating in the annual staff dinner, was the conspicuous success which is customary in organised telephonic events. The meeting was organised on a more ambitious scale than formerly, four papers on important subjects having been prepared well in advance and each paper subjected to careful criticism by two competent writers, these critical essays practically forming supplementary papers. The meeting lasted two days, with an attendance of well over 200, and a valuable and instructive discussion was had on the selected subjects—"Contract Department Work," "Recording of Calls," "Line Distribution," and "Exchange Organisation." It would have been hard to choose four topics of more urgent interest in the present state of telephone development in this country. We shall hope to publish at a later date some account of the conclusions arrived at.

During the second day of the main meeting a meeting of Contract Agents was held at Telephone House. The first organised Contract Department of the Compauy was established three years ago. At the meeting held last month the roll-call contained the names of 27 heads of Contract Departments from different parts of the country, so it is seen that good progress has been made in this direction. The Contract Department is the Company's business representative with the public, and it is called upon to do much valuable work in educating the public up to a proper appreciation of the telephone service and of the rates and conditions. That the Contract Agents are learning their work rapidly was shown by the animated, practical, and instructive debate at the meeting of May 18, a debate which covered ten important topics relating to Contract Department work, and did them all fair justice. Doubtless every Contract Agent present left the meeting with a better idea of the scope of his work than he had before and with some new and practical hints from the varied experience and ideas related.

Of the dinner we can only say that it brought the convention to a fitting and enthusiastic close. There must be something wanting in any man who sits down to dine with this great gathering of staff and guests without feeling a glow of pride in the great organisation to which he belongs. The dinner itself is always excellent—Messrs. Lyons know their business, and, as good judges in the matter, we admire their organisation—the entertainment is good, and the great banquet hall of the Trocadero almost all that could be desired as a setting. But the keynote of the event is the manifestation afforded of the solidarity, enthusiasm, and alertness of the great body of men who are carrying on the telephone business all over this great country, of their keen interest in their work, and their loyalty to to those who direct the entire great organisation. This enthusiasm finds full vent when Mr. GAINE makes the speech of the evening. It was of unusual interest this year and will be found in full in this issue. Every point was appreciated with the keenest interest. The staff were especially fortunate on this occasion in having as their guests the new President and Vice-President of the Company (Mr. FRANKLIN and Mr. SANDS), and other Directors, also Lord KELVIN, the grand old man of electricity. Lord KELVIN made a cordial and graceful speech to the staff, in clear and vigorous tones that belie his eighty-two years, and was loudly cheered.

PRACTICAL ESPRIT DE CORPS.

"THE Company has nearly 16,000 living Contract Agents. How many act?" This very true statement and very pertinent query, due to Mr. EDGAR J. FRASER in the May JOURNAL, are well worthy of serious thought by every member of the staff. The keynote of the General Manager's message in the first number was enthusiasm for the great industry in which we are engaged and team work from all members of the great organisation to which we belong. That note has struck many a responsive chord up and down the land, and it is evident that the enthusiasm is not lacking nor the desire for effective team work wholly dormant. There are many ways in which the spirit of enthusiasm and of hearty co-operation may find vent. Enthusiasm and team work will build lines, instal instruments, clear faults, complete calls more quickly and more effectively than they are built, installed, cleared, and completed when interest is lacking and co-operation absent.

But one most practical and effective form of *esprit de corps* is the spread of the telephonic faith among the general public—the education of the public in the value and economy of the telephone service. Here can the telephone enthusiast find legitimate scope for his enthusiasm and a vast field in which to sow the seeds of his knowledge. For every man or woman who knows something of the usefulness of the telephone service, of its working, of the results which it accomplishes or is capable of accomplishing, there are ten who know nothing of all these things. Although the telephone service is twenty-five years old and has been written about, advertised, praised, abused, investigated, and legislated upon times without number, the great majority of people have no real understanding of the value of permanent telephone service and of its low cost in proportion to service rendered to the user.

By spreading this knowledge far and wide, by demonstrating to all and sundry that the telephone service is beyond compare the quickest, the most direct, the most complete, and the cheapest means

of communication in existence, every member of the staff can help the Company and himself. Whatever makes for the general progress of the Company makes for the general progress of the staff. We have nearly 16,000 living Contract Agents, and how many *act*? It is not necessary, as Mr. FRASER says, that telephones and Company work should be the staple subject of conversation at all times. But almost every member of the staff has almost every day at least one opportunity to interest some member of the public in the telephone service. Some of the staff have several such opportunities daily, while even those who are most removed from contact with the general public and lead the simplest of lives in private have an opportunity once a week or so. Let every opportunity be taken advantage of. Welcome every inquiry about the telephone. Explain the working of the service, the magnitude of the plant and organisation, the enormous usefulness of permanent connection with the telephone system, the value of the service in emergency and the real cheapness of the rates, having regard to what is accomplished by a year's use of the telephone.

In our Correspondence columns will be found a pointed letter from an intelligent wayleave officer who has seemingly been discouraged by a fellow-worker from acting as a business missionary. That is a mistake. It is perfectly true that the actual detail work of completing the contract is the province of the Contract Department. But to be able to explain the service and quote the rates should be within the knowledge and capabilities of every telephone worker. Mr. POULTON is on the right track, and we trust there are many more like him in all ranks of the staff—enthusiasts ready and anxious to make converts to the telephone whenever they can find the opportunity. The man who discourages such enthusiasm is working in too narrow a groove and not doing himself justice. Incidentally, Mr. POULTON'S letter shows that there is a demand for just what the Company has in preparation—a business "Handbook of the Telephone Service," for the use of all employees whose work brings them in touch with the public. This book, while primarily intended as a Contract Department handbook, will give general information as to the various classes of service, the rates and the reasons for them, the working of the service, and a quantity of special and detailed information on the actual handling of Contract Department work which all our 16,000 living Contract Agents will find useful.

MICHAEL FARADAY MEMORIAL.

IN the first number of the JOURNAL on page 10 was a note describing the circumstances regarding MICHAEL FARADAY'S connection with the North Exchange, London, and a suggestion was made that a permanent memorial of his association with the building should be erected. This has now taken definite shape, and we commend it to the very earnest attention of the staff, feeling sure that a large number will be anxious to associate themselves with the connection that has happily been found to exist between that eminent electrician and the telephone. It will be remembered that the circumstances related in the first issue of the JOURNAL were as follows:—The building which now contains the North Exchange, London, was formerly a meeting house of the Sandemanians, and in that building FARADAY regularly attended the services as an Elder from 1862 to 1867, the year in which he died.

It is proposed that the memorial shall consist of a tablet erected in the switchroom, and to this end a subscription not exceeding a shilling is invited from any member of the staff who desires to be identified with the memorial to FARADAY.

Lord KELVIN has very kindly promised to perform the ceremony of unveiling the memorial and the staff owe him a debt of gratitude for this promise.

We feel sure that District Managers will gladly receive any subscriptions that may be tendered to them, and will forward them to one of the members of the following committee:—Messrs. A. ANNS, J. C. CHAMBERS, C. B. CLAY, A. COLEMAN, W. W. COOK, F. COWLEY, R. A. DALZELL, WM. E. L. GAINE, F. GILL, S. J. GODDARD, C. J. PHILLIPS, R. SHEPHERD, and F. D. WATSON.

The subscription list will be closed on June 12.

THE SUBSCRIBER'S RESPONSIBILITY.

> "I see some changes, and many tendencies toward change. In London, particularly, people seem to move a little faster than formerly—of course, by "people," I mean people in the electrical business and those using electrical services—I am not discussing the people of England at large. For instance, there is a marked improvement in the telephone service. Part of this is due to better work at the exchange, but most of it is due to better manners and customs of the telephone users. Some of my business friends, who three years ago left their telephones to the casual attention of the office boy, have either obtained a superior article of office boy and made the telephone his primary duty, or have installed a girl and a private switchboard with a sufficient number of desk telephones, and in those cases where the casual office boy still reigns, something seems to have happened to the boy."

The above quotation is from an article in our sprightly contemporary the *Electrical Times* by an anonymous American visitor, who gives an interesting summary of his impressions of those features of life which most impress the electrical man. We rejoice that this keen observer has been able to record an improvement in the operation of the public end of the telephone system. His observations are quite correct. There has been during the past few years an improvement in the attitude of both Press and public towards the telephone service. It is much less the fashion than it was formerly to brand the National Telephone system as both backward and feeble, and the users of the telephone are getting more and more to regard the service as a business machine to be used in a businesslike way. But there is still a long way to go in this direction before the general development and general efficiency of which the telephone service is capable can be attained. The manners and customs of a certain proportion of telephone users have certainly improved and there has resulted a certain improvement in the service, but telephone users as a body are still far from realising that the quality of the service must necessarily depend at least as much on the efficiency of the subscriber as on the efficiency of the exchange equipment and organisation.

There are still far too many telephone users who do not perform effectively their share of the operation of the service—who are careless in speech, give numbers inaccurately and indistinctly, speak aggressively to the operators, refuse to believe that the line wanted can possibly be "engaged," answer their bells after long delay, and commit other little sins which result in friction and delay.

A moment's thought should show any telephone user that the telephone service is essentially a co-operative institution. For the proper exchange of a telephone message co-operation is required between at least three persons—two subscribers and one operator. For the best results it is essential that each shall do his share of the work smartly and efficiently. If A gives numbers wrongly or indistinctly, or speaks roughly to the operator, or rings in her ear when she is trying to carry out her wishes, he works directly against the efficiency of the service; if B lets the telephone bell ring for two minutes before he troubles to answer it, he also materially reduces the efficiency of the service. Do A and B ever stop to think of these things? Or do their employers ever stop to think of the aggregate effect on a service which is measured by seconds of hundreds and thousands of A's and B's daily using that service in such a way as to militate directly against its efficiency? Do they realise that in so using the service they are reducing its value to themselves? We opine not. If every telephone subscriber were suddenly to awaken to the realisation that the general efficiency of the service largely depends on the intelligent working of his own telephone or telephones there would be a rapid improvement which would be worth a return visit of our American friend to observe.

In this issue we print an excellent article by a London operator on the working of the public end of the service, in which some of the besetting sins of the careless telephone user are set out. The whole article is a plea for more cordial co-operation between subscriber and operator and for a better understanding on the subscribers' part of the essential points in the working of the service. If the subscriber, or rather the user, for most telephones are used by several people every day, will do his part always with smartness and with consideration for the human part of the machine, he need have no fear but that the operator will do her share with maximum efficiency. Telephone operators are as conscientious and willing a body of workers as any to be found. They have to perform—at high pressure during much of the day—work of no little detail which is useless unless it is accurate and unsatisfactory unless it is rapid. In the main they do it very well, and they are constantly striving to do it better. They are not perfect, nor is the machinery with which they have to work; occasional defects and failures necessarily occur in such a complicated organisation of intricate machinery and numerous operatives, dealing with such a vast daily volume of detailed operations. But all members of the public using the service would get better results from the service if every member of the public would always realise when he is using the telephone that for the time being he is part of the organisation and that effective results depend partly on his effective operating.

THE SAN FRANCISCO DISASTER AND THE TELEPHONE SYSTEM.

"WE have lost, so far as we can estimate, about 33,000 subscribers out of 52,000. We lost six operating buildings, in addition to our main executive building." Such are the brief sentences in which Mr. LOUIS GLASS, General Manager of the Sunset Telephone Company, relates the effect of the great fire on the San Francisco telephone system. It is the greatest telephone disaster since the telephone service became a part of city life, and the imagination hardly grasps its extent. Six exchange buildings destroyed, 33,000 subscribers' instruments in the ashes of the general ruin, and distributing cables burned off in all parts of the city, Imagine London Wall, Bank, Avenue, Holborn, Westminster, and Gerrard all completely gutted, and Salisbury House burned out, with all the records of the Metropolitan division gone up in smoke, and we get some idea of the devastation of the San Francisco telephone system. The sympathy of the civilised world has gone out to San Francisco in her awful week of trial by fire. The keenest and deepest sympathy of every National Telephone man and woman —many of them know what a telephone fire means—will go out to the whole staff of the Sunset Company. That they will rebuild and emerge from the general wreck on a larger scale and more prosperous than ever, we know well. Already telephonic communication has been partly restored in the burned out district. presumably by means of public telephones, and the long distance business is exceptionally heavy. Doubtless steady progress will be made until the service is entirely restored, and to all our American telephone brethren engaged in the great work of rebuilding an entire city telephone system we heartily wish Godspeed.

EUROPEAN TELEPHONE DEVELOPMENT.

WE are so often told by our censors that Great Britain is hopelessly behind the rest of the world in the development of the telephone that the actual facts and figures must be somewhat surprising to many people Some of these figures were mentioned by Mr. GAINE in his speech at the annual dinner. It may be worth while to give a few more. In the whole of Europe, with an aggregate population of 380,000,000, there were at Jan. 1, 1906, a total of 1,675,000 telephones in service. This gives an average telephone development of 4·4 telephones per 1,000 inhabitants. Great Britain, with 42,000,000 of population, had 425,356 telephones, a development of 10·1 telephones per 1,000. Therefore, Great Britain, with 11 per cent. of Europe's population, has 25·4 per cent. of Europe's telephones, so that the telephone development of these benighted isles is nearly two and a half times as great as the average throughout Europe. Excluding Great Britain, the average telephone development in all of Continental Europe is only 3·7 per cent., 1,250,000 telephones to 338,000,000 of inhabitants; thus, British telephone development is nearly three times as high as the average of the rest of Europe.

It is somewhat startling to find, when we have been told for years that British telephony is several fields behind the rest of the world, that in Great Britain there are 30,000 more telephones than there are in eleven countries of Europe, having an aggregate population of 288,000,000. It is somewhat startling to find that only three countries of Continental Europe have more telephones than there are in London alone, that the total telephones in France number less than a third of those in use in Great Britain, and that there is only one European country having a larger number of telephones in service than we have in this. That country is the German Empire, including Bavaria and Wurtemburg, with a total population of over 58 millions. In the German Empire there are 593,535 telephones, the relative development, 10·2 telephones per 1,000 inhabitants, being almost identical with that of Great Britain. The increase of the telephone system is proceeding more rapidly

here than in Germany, however, and British telephone development will soon pass that of the German Empire.

Whether we shall ever approach the prodigious development in the use of the telephone which obtains in America is another matter. For a variety of reasons the telephone service has entered into the life of the American people to an extent which is hardly conceivable by those who have had to struggle against the numerous adverse influences that have checked the advance of British telephony. It is commonplace now in American cities to find an exchange telephone on every office desk, on every shop counter of large shops, in every hotel chamber, even in every room of moderate-sized private houses. The exchange telephone is getting to be the inseparable companion of the American by day and by night, and he relies on it for an infinite variety of purposes. In all this we are a good ten years behind the United States. We know the main causes which have held back the telephone in this country, and there is little profit in rehashing the long story of the Company's past difficulties. But there is another cause—the innate conservatism of the British character, the general unwillingness to use the telephone properly and to appreciate the real value of the service. In the education of the public on these points American telephone practice is far in advance of ours. But we are picking up, and there are rays of light here and there. The British public is a difficult public to educate, but we are going to teach it what telephone service really means—if we have time.

MUNICIPAL TELEPHONE FINANCE.

THE Local Government Board inquiry into the application of of the Swanse Town Council for sanction to a loan of £7,000 to extend the municipal telephone system, brought to light some interesting figures bearing on the hopeless financial condition into which unreliable plans and estimates and uncommercial rates have led the municipal telephone concerns. The inquiry was suddenly adjourned after a short hearing, as the Inspector discovered that the larger part of the loan applied for had already been spent, and much of it on work of a different character from that described in the application and shown on the plans. The Town Clerk was as much surprised at this discovery as the Inspector was annoyed, and asked for the inquiry to be adjourned so that a fresh application might be prepared. No comments on the class of business management thus revealed were made, and they really seem to be superfluous. We are getting accustomed to finding that whenever any real inquiry is made into municipal management of technical businesses, the most deplorable state of muddle and confusion is revealed.

Apart from once more demonstrating this slipshod style of administration, the Swansea telephone inquiry showed clearly that municipal telephones are operated at a heavy loss. The total capital cost of the Swansea system is £27,172. Applying the usual discount to the usual inflated statistics, there are 902 direct exchange lines, giving an average capital cost per line of over £30, as against the estimated £20. The accounts show a paper "profit" of £534, but they also show a large capital expenditure during the year, considering the small growth of the business, and such trifling charges for working expenses as would lead one to suppose that in Swansea, telephone lines, switchboards, and instruments, maintain themselves automatically. No allowance for depreciation has been made, though much of the plant—three years old—is admittedly obsolete, and the Postmaster-General, after an expert valuation, has offered for the entire system £10,000 less than its book cost. Presumably, the Swansea Town Council, and some others in the same boat, think that the Postmaster-General and his technical advisers do not know their business, but the reasonable probabilities are that the telephone business is better understood at St. Martin's-le-Grand than in any town hall in the country. The municipal telephone systems are clearly living on their capital, and working at a heavy annual loss; we have always contended that this was the only deduction to be drawn from the various municipal telephone accounts. The terms offered by the Post Office for the purchase of the various systems—terms based on an expert examination and valuation of the plants, and showing that depreciation must be reckoned with on a liberal scale—prove the correctness of our contention. It remains to be seen how long the municipalities will persist in throwing good money after bad.—(*Electrical Review.*)

THE PLAINT OF AN OLD OXONIAN.

BY W. H. GUNSTON.

A CORRESPONDENT recently wrote to *The Times*, signing himself "An Old Oxonian" protesting against the use of the telephone, which he regards as a "formidable encroachment in the sacredness of private life."

A graduate I was of yore
Besides the banks of Isis,
Where I imbibed much ancient lore
And sundry prejudices.

And when I left, with ripened mind,
I'd learn to view askance
Most things by engineers designed,
And most that spell "Advance."

Judge, then, if unperturbed I see
The Telephone in use
Within the Sacred Home of Me,
Respectable Recluse!

My hallowed Privacy no more
In fulness I enjoy.
Each ring may join me to some bore,
Or blatant office boy.

A shrill bell tinkles in my room;
I speak—as I'm not used—
With some Young Person unto whom
I've not been introduced.

Intrusive femininity
May wheedle on the wire
And win me for "At Homes" which I
Detest, or don't desire!

The jangling bell seems like a blast
Blown from some magic horn
At which my British Castle fast
Dissolves like mists at morn.

I lose my father's honoured name
For Six-O-Eight-O West,—
Which may to them sound just the same,—
To me an ill-timed jest.

Time was when I (or such as I)
Held Steam in like disdain;
Yet oft I stoop to travel by
The Liner or the Train.

Convenience converted me,
By slow degrees progressing;
But shall I learn from that to see
In Telephones a blessing?

No! let Americans by wire
Guide their ill-balanced lives;
Within my Castle I retire
Where True-Blue temper thrives.

THE RESPONSIBILITIES OF LOCAL MANAGERS.

THE Keighley Local Manager, whilst at the West Yorkshire staff dinner at Bradford on March 31, was informed that a fire had broken out at a large mill in his locality, and that a portion of a junction route containing 30 wires had been burnt down. He immediately collected his men and proceeded to the scene of the fire. The whole burnt-out section was re-erected by 9·30 on Sunday morning.

This is an illustration showing how imperative it is for the telephone man to always be ready for duty.

CORRESPONDENCE.

THE COMPANY'S CORRESPONDENCE CLASSES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REPLYING to the letters which have appeared, the Correspondence Classes dealt last session with nearly 2,400 students, and consequently there are sure to be cases in which the scheme of the classes does not precisely meet individual requirements, but the committee which deals with the classes is most anxious to make them efficient and popular, and has considered very carefully the comments which have been made in the correspondence referred to.

The main points are these :—

1. Too much mathematics.
2. Instruction somewhat above the head of the average student.
3. Want of trust and confidence between instructors and instructed.
4. A special department to control classes.
5. Fees to be kept low.
6. Communications between instructors and students to be sent direct to the latter privately.
7. A local instructor in each district or centre who could by word of mouth clear up any little difficulties there might be in the papers.
8. Results of the classes to be published in the JOURNAL.
9. The instruction to be systematic and extend over say, three years.
10. All books to be issued at commencement of session already bound and indexed.

To deal with these points *seriatim* :—

(1).—It is impossible to avoid mathematics in connection with our work, and the man who wants to make real progress must not neglect the subject. In order, however, to help students to the utmost next session, if sufficient support be obtained, the mathematics course will be split into two portions and considerably amplified, one being very elementary and the other more advanced.

(2).—In endeavouring to serve between 2,000 and 3,000 students of varying capabilities, it is of course very difficult to word the matter in exactly the terms which suit each individual man, and all that can be done is to try to put the matter in such a way as to best meet the needs of the majority. This is the endeavour and, generally, it is thought the result is satisfactory. That the needs of the staff are to some extent being met appears evident from the fact that the membership of the classes has varied as follows during the last two sessions :—

Session	Total number of members of classes.	Percentage of members on the entire staff of the Company.
1904-5	1,450	10·47
1905-6	2,377	15·13

Students are always free to ask questions on any difficulty, which will be fully replied to in the ordinary way.

(3).—If the students feel any distrust in those who control the classes it is very much to be deplored.

(4).—A special department in the shape of a committee does exist for dealing with these classes.

(5).—Were it not for the fact that the Company makes a considerable grant towards these classes they would not exist at all.

(6).—Papers can be, and are, sent individually to members of the classes on the recommendation of the District Manager.

(7).—This idea is an excellent one, and in one case, it is believed, it has been put into practice. The matter, however, must to some extent rest with District Managers. If a competent officer willing to devote himself to this work could be found we could wish for nothing better.

(8).—To publish the full list of names would involve too much space, but the names of those who have secured the first five places in each course of the classes you have kindly agreed to publish in the present issue of the JOURNAL.

(9).—The instruction is at present designed on systematic lines and covers what is actually a four years' course.

1st year	..	"A" Course and Mathematics.
2nd ,,	..	"B" ,,
3rd ,,	..	"C" ,,
4th ,,	..	"C" ,, (continued).

If students wish to benefit by the instruction, they must take the courses in their proper sequence unless specially qualified to do otherwise.

There is too much tendency for men to make a start and take perhaps the first year's course, and then drop out of the classes altogether.

(10). There are arguments for and against the adoption of this suggestion, but the matter will be considered.

London, May 23, 1906. P. H. C. PRENTICE,
for the Correspondence Classes Committee.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I OBSERVE a correspondent suggests re-organising the Company's classes. Apparently this course is necessary. The first few papers in the present session came regularly enough, now they seem to have fallen away altogether. This seems hardly fair, as members are required to pay for the different courses in advance. The corrections in question papers also leave room for criticism. In some instruction papers I have pointed out slight errors, and was informed they made no difference to the ultimate result ; yet when a similar mistake was made on answer sheets, the marks were not awarded. This I have known to occur more than once.

Mr. Williams gives some very clear ideas on the subject, which, if carried out, would add materially to the success of the different courses. After this session, unless the classes are arranged more systematically, I am afraid the majority of the staff will not risk an addition to their education in the line of correspondence.

I would suggest that one or two pages of the JOURNAL be devoted exclusively to articles relating to the different branches of the work. This, I think, would make the paper much more instructive and interesting.

With these attractions, members of the staff would subscribe who would not be connected with a correspondence class, as the mathematical problems are beyond their capabilities.

Most other journals of a like nature have these additions, so I think we should be no exception to the rule, J. LOWRY.

[NOTE.—At present the whole JOURNAL is "devoted exclusively to articles relating to the different branches of the work." We hardly catch the precise point of Mr. Lowry's suggestion.—*Ed.* "N. T. J."]

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

As a member of the junior technical staff I heartily agree with Mr. Alex. Williams' complaint, and endorse his suggestions.

To take a single instance, a man would be "floored" in nearly every paper in the "A" course, who did not know how to transpose equations ; or again, a good mathematician might easily obtain distinction by merely looking up the formulæ relating to the particular questions he is set to answer, without so much as reading the more interesting matter in the books.

I think we are under an obligation to Mr. Williams for bringing this matter forward, and I hope it will be discussed in the JOURNAL.

Canterbury, April 11, 1906. O. C. GOODWIN.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE letters which have appeared in the JOURNAL on this subject appear to reveal a low standard of electrical education among some of the telephone students. Are we to gather from these letters that the classes are beyond the grasp of the average telephone student ?

Surely the students referred to in the correspondence held some qualification before they were admitted to the service, and assuming that this qualification was equivalent to the passing of the "Oxford and Cambridge Locals," they ought to be well equipped scholastically to answer the questions set.

The burden of the letters appears to be asking the Company to educate the men, instead of *vice versa*—the Company paying them for their knowledge.

Mr. Mann in his last paragraph just touches the vital spot, which is my contention—that the students ought to possess this knowledge before entering the service.

As regards the fees being too high at 15*s*., I consider the price ridiculously cheap. Where can another institution be found to educate one electrically for 15*s*. ?

Keighley, May, 1906. E. PARKINSON.

ESPRIT DE CORPS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE article by Mr. Fraser in the JOURNAL for May will, no doubt, meet with general approval ; but I should like to ask how many, out of the "16,000 living contract agents" referred to, have been instructed as to the proper course to pursue when a likely subscriber asks for information ?

As a wayleave officer I found that my duties brought me into touch with many of the public who expected me to know all about the different charges for service. I asked my fellow-officer who initiated me into the work as to my best course, and was told to refer all likely subscribers to the Contract Department, London Wall, as I was not a canvasser but a wayleave officer.

London, May, 1906. W. R. POULTON.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IT struck me as being particularly appropriate that the General Manager should in the opening number of the JOURNAL pen the very inspiring words which he addressed to every member of the staff.

The reference to the need for diplomatic wayleave officers strikes a chord which seems to call for some response.

I have sometimes wondered whether we have ever fully realised the transcendent importance of the wayleave question.

Whether there is not a danger, that in our concern for other matters (important in themselves), of our relegating to a second place one of the chief, if not the chief factor, upon which the great engineering structure is built and without which it could have no existence at all. The fact is that the mere mention of wayleaves is nearly always sufficient in any assembly of telephone people to provoke a smile. Apparently there is a danger of our sense of humour warping our sense of proportion.

I am convinced that there is an urgent need for all who have the handling in any measure of this question to realise that there is no more serious matter which can possibly engage their attention, as there is also none more fraught with possibilities of good or evil to the Company than the wayleave problem.

A good deal has been heard lately in regard to completions, and a healthy competition has been engendered by which it is sought for the greatest possible number of subscribers to be joined up within a given period. However, this is contingent upon wayleaves, and these largely depend upon the ability of those who have to obtain them.

It by no means follows that the person who is no good at anything else will make a brilliant success of wayleaves.

In speaking of wayleaves I would make a distinction between the ordinary everyday sort, and the most delicate and important negotiation of intricate matters, in which the person concerned has to encounter some of the keenest intellects and exceptionally shrewd business men on something like equal terms if anything satisfactory is to result.

It is no wonder if the person whose only stock-in-trade is bluff and an unlimited capacity for prevarication finds himself completely outclassed, and has to beat a hasty retreat with as much dignity as he can.

The fact is that the work requires men with backbone, grit, and tact, coupled with good business ability. Men with all these qualities in the right combination would adorn any service they might have entered.

A general levelling-up seems to be imperative, and if every person concerned will realise to the fullest extent the dignity of the position and the supreme importance of the issues involved, and more strenuous endeavours are called forth, the result cannot fail to be one for congratulation from every point of view.

A. ECCARDT.

April 20, 1906.

TELEPHONE SOCIETIES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IN the first two issues of the JOURNAL are reports of Telephone Society meetings at Blackburn, Brighton, Glasgow, Hanley, Liverpool, London, Manchester, and Sheffield. There are none for other large centres, such as Birmingham, Cardiff, Leeds, Dundee, Bradford, Hull, Nottingham, Belfast, Portsmouth, Edinburgh, Bristol, Newcastle, and Dublin, and even others larger than Hanley, for example.

The tendency of to-day is to make the demands on the capabilities of the staff more and more severe, and the discussions at the meetings of these societies form a valuable means of keeping in touch with work other than that directly under one's nose.

This being so, are the staff in the places named debarred in any way from this means of advancement, or have they not sufficient energy to organise societies?

There is also another question, viz., cannot some arrangements be made whereby operators may participate in the meetings? The societies would undoubtedly benefit by the discussion contributed by this staff, if they would be willing to attend and speak at the meetings, or, at any rate, at some of them.

In one or two cases they have been invited to attend, and they have shown themselves an interested and critical audience.—Yours truly,

May, 1906. X.

QUESTIONS AND ANSWERS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

No doubt we have not yet fully realised how great a medium the JOURNAL may become for disseminating knowledge among the Company's employees. It has occurred to me that a small space devoted to difficult questions and answers which are sometimes met with by those members of the staff (collectors, canvassers, and wayleave officers) who transact business with the public would be extremely useful. The chief point in the education of the staff in these departments is to provide a suitable answer to any question; the best of answers chosen from all the districts and published in this paper would be of inestimable value, more especially to new men. It would, of course, involve a considerable amount of work in preparing a list of the most frequent questions and the best answers sent in, but if it resulted in the extra efficiency of the staff, which might reasonably be expected, it should end in advantage to the Company.

A. WILSON.

TRAINING STAFF.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE discussion of this subject in the JOURNAL would, I am sure, be welcomed by many members of the staff. There are five great divisions into which the question naturally divides itself, viz., Electrical, Engineering, Clerical, Traffic, and Contracts, and leading officials specially conversant with the subject might be asked to contribute articles under each heading. In connection with the electrical staff, it has been felt by all in daily touch with the subject that with the increasing staff required by the Company, and with the more intricate knowledge necessary to deal with complicated circuits, a thorough training is an absolute necessity, and that if this were carried out a good type of inspector would be induced to take to telephony as a branch of electrical engineering offering good prospects to the right class of man.

With the certainty of permanent employment which the staff can look forward to, encouragement is given for special study.

The Company in recent years has done a good deal in the way of payment of fees at technical colleges, grants to telephone societies, correspondence classes, etc., and in the latest sturdy chick, THE NATIONAL TELEPHONE JOURNAL, a medium has been opened up which may be productive of much good.

There is still something to be done to focus and take advantage of these various agencies, and I trust through the medium of your columns some definite scheme may be propounded.

Glasgow, April 14, 1906. W. A. VALENTINE.

TRUNK TICKETS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH regard to a paragraph in the JOURNAL headed "Suggestions from Dundee," I would point out that a similar arrangement has been in vogue in Hull for some months, with a result that it entails less work for the clerks concerned and affords much greater convenience in ascertaining the information required.

W. R. SENIOR.

BENEVOLENT AND PROVIDENT SOCIETY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

AT the tenth annual Metropolitan staff dinner on February 26, Mr. Clay, Metropolitan Superintendent, made an admirable suggestion, viz., the formation of a benevolent fund. In the May issue of the JOURNAL we are informed that a meeting was to be held at Salisbury House on April 26 for the purpose of discussing the advisability of the promotion of such a club.

Whilst waiting for the result of the meeting at Salisbury House and during the interim I beg to submit a few remarks and suggestions. Doubtless it will be admitted throughout the Company's districts that such a society is needful, and would afford many an opportunity of contributing to the administration of temporary or permanent relief in cases of distress.

At present the suggestion refers only to the Metropolitan district, with a staff of 4,000. As Mr. Clay states, if this number were to subscribe 1*d.* per month, an amount of £200 would be produced in a year.

The whole staff of the National Telephone Company numbers, I believe, about 16,000. With so great a staff there must be continually arising cases of distress that could be relieved satisfactorily if there were a general benevolent society. I would therefore humbly suggest that we, one and all, unite in contributing to such a worthy cause and pay not merely 1*d.* per month but 1*d.* per week. This is not a very great sacrifice to make and I feel sure that all districts will generously respond.

True, there are friendly and provident societies without number, but would it not be more pleasing to assist directly our own fellow-workers or their families, as the case may be.

A case has occurred in the Gloucester district where a foreman, owing to the loss of his eyesight, has been compelled to relinquish work. He has been a faithful steady worker and before coming to Gloucester was in the Company's service at Bristol. He is advanced in years, and the two districts named afforded some little temporary assistance; but if we had a benevolent society his case could have been submitted upon the recommendation of the District Manager, and no doubt he would have adequate assistance.

Other cases could also be met, widows of our fellow employees assisted, and children placed in public schools or apprenticed to trades. In various other ways we could show practical sympathy with unfortunate comrades in the service.

I think that Mr. Clay's suggestion thus expanded would meet with a general response which would result in the organisation of The National Telephone Benevolent Society.

Gloucester, May 5, 1906. S. G. HARE.

FIRE DRILL.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I NOTICE in No. 1 of the JOURNAL particulars regarding fire-drill at Leicester, but as Leicester is a comparatively small exchange, with I believe a total operating staff of only twenty, it may interest your readers to hear how rapidly a large London Exchange, "Gerrard," was cleared on the fire-alarm signal being given. I should state that Gerrard Exchange is very much scattered, as the following will show:—

Basement.—Power plant.
Ground Floor.—Testroom and operators' dining-room.
First Floor.—No. 1 exchange and distribution room.
Second Floor.—No. 2 exchange.
Third Floor.—No. 3 exchange in course of construction and operators' retiring room.

On the 10th instant at 1.36 p.m. the fire-alarm bells were rung and within 30 seconds the current was switched off all circuits, and the operating staff had left No. 2 exchange; five seconds later the whole of the operators had left No. 1 exchange (the staff in this room was more than double that in No. 2 exchange). In 40 seconds from the ringing of the bell the male staff had reached the third floor with fire hose, sand pails, blankets, etc., having had to pass the operators, who were leaving the building by the main staircase. At the expiration of two minutes 30 seconds the whole of the operating staff on duty at the time, numbering 186, had left the building. The signal was given to them to return and all staff were back in their places well under seven minutes from the time the alarm was given.

It would be interesting to know with what rapidity some of the largest exchanges in the kingdom are cleared on the fire-alarm being given.

C. S. ARROWSMITH.

AN APPEAL.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

Is there any room in the JOURNAL for the recording of "suggestions" sent by the various members of the staff to Head Office? No doubt there are many besides myself who would welcome a simple acknowledgment of ideas submitted.

If the Committee would but picture to themselves the eagerness with which an idea is worked out, and feel the "conviction" in the mind of the "struggling genius" that *at last* he has found the "philosopher's stone," experience the pride in submitting this product of midnight oil and tobacco smoke, live the happy moments of encouragement afforded by an interview with a kind-hearted District Manager—then, the "tedious wait," the "impatient enquiry," and the "final disappointment" when a type-written document in the negative strain is eventually received—I am convinced that, rather than inflict this distress on super-sensitive minds, the Editing Committee would willingly crowd a few lines of acknowledgment in a corner of the JOURNAL.

I speak on behalf of the numerous "struggling geniuses" which the Company's staff contains. Maybe, the Engineer-in-Chief's staff have their grievances also and find their patience sorely tried.

Leicester, April, 1906. ERNEST RENDELL.

ANNUAL ATHLETIC SPORTS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

The employees are evincing great interest in the above suggestion, and would like to have the views of the heads of departments (Metropolitan and Head Offices).

It is suggested that these sports be held during Whitsun—commencing next year—so as not to interfere with the Company's business.

Should the holding of such annual sports meet with the approval of the principals, a meeting will be convened, when it is hoped that satisfactory arrangements will be made for the carrying out of the same.

Suggestions and criticisms invited.

67, Telephone House, E.C., May 1, 1906. J. H. FITZGERALD.

REGISTERING CORRESPONDENCE AND FAULTS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

Now that members of the staff scattered over the British Isles are in a position through the medium of the JOURNAL to express their own views and learn those of others, it is hoped that from the many good, bad, and indifferent methods employed in dealing with certain matters it may be possible to select and adopt the best.

Two such subjects occur to me among others which could be discussed with advantage:—

(1) Registering and filing of correspondence.

(2) Registering and dealing with faults.

On both I have a perfectly open mind, *i.e.*, I am not satisfied that I know the most efficient, rapid, and economical methods. I would therefore ask my colleagues to help me to arrive at a decision.

The usual reply—that much must depend upon circumstances—is hardly convincing, for although there must be exceptions, the conditions that obtain in the majority of our offices and exchanges are so similar that something approaching uniformity on the best lines should be possible. Let me then ask the readers of the JOURNAL to indicate the weak points in the methods outlined briefly below:—

(1) REGISTERING AND FILING OF CORRESPONDENCE.

All letters received are entered in the Letters Received Register and numbered consecutively from Jan. 1 each year. As far as possible, all letters containing cash are entered consecutively, and when these are handed to the cashier the register is initialed by him opposite such entries. The Letters Received Register is not indexed.

When communications from the public are replied to (and the carbon attached where letters are typed) they are filed in alphabetical order in Amberg, or other cases, each letter having marked on it the number of the case in which it is placed. Each case is marked with the initial letters of the correspondence, and the dates showing period covered by it. Such period begins on the first day of a month and ends on the last day of a subsequent month, as for instance, "Case No. 10, A to C, May 1 to July 31." For filing correspondence with departments a case is used for each department, and the correspondence is filed under the subject matter, the case being marked with the name of the department and the dates, as before. When correspondence on a subject is prolonged, or is of special importance, it is entered in an index under the subject matter and the name of the individual firm or department concerned. The number of the case in which such correspondence is to be found is shown opposite each entry. All files are numbered consecutively.

Amberg or other cabinets are not used.

Each letter filed has placed opposite its entry in the Letters Received Register the number of the file in which it may be found.

All letters removed from files are replaced by slips on which are entered the names of the offices calling for them. If correspondence re-opens and additional letters are attached, these slips have entered on them the numbers of the files in which the correspondence is finally put away, so that no new numbers are required in the Letters Received Register.

REGISTERING AND DEALING WITH FAULTS.

Faults reported in writing are immediately acknowledged and so marked and forwarded to the fault clerk or the individual acting as fault clerk.

Faults reported by telephone to the exchange are at once entered in the exchange register. Form No. 79 is made out and dispatched to the fault clerk.

Faults reported to the office are also entered on Form 79 and dispatched to the fault clerk, and he is responsible for all delay in clearing faults. He attaches slips to all written complaints, giving results of the tests or inspections after entering particulars on fault cards, and returns these written complaints with slips attached to the district or local office as the case may be. Subscribers are then informed by postcard or letter that the faults have been removed.

All faults reported to him on Form 79 are tested and particulars entered on the fault cards; the forms are returned to the exchange when faults are cleared and are there filed in numerical order.

The fault clerk is responsible for arranging inspectors' duties, checking their time, number of calls made, etc. The test clerk tests any line at the fault clerk's request.

Does this conform as nearly as possible with the system adopted where monitors' tables with full equipment are in operation?

Bristol, May, 1906. R. A. DALZELL.

"THE FIRST LINE IN THE FIFESHIRE DISTRICT."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MANY of his friends will join in spirit in congratulating Mr. A. McLean of the Fife district on the interesting occasion recorded in this month's JOURNAL. Your last sentence is, however, somewhat misleading. The exchange at Kirkcaldy was, I believe, opened in 1881, and ranked then somewhat in the relation of a centre in the Edinburgh district. I claim to have had the honour of running the first line in those days, but I believe Mr. McLean ran the first after the elevation of Fife to the standing of a district.

Edinburgh, May 12. HENRY M. BIRD (Foreman, Edinburgh district).

STAFF GATHERINGS.

Leicester.—The concert promoted on behalf of W. H. Taylor was very successful and, although full details are not yet to hand, the indications are that about £10 will result. Mr. Leonard Price, Local Manager, presided in the unavoidable absence of the District Manager, and in a neat speech passed a vote of thanks to the artistes—all of whom gave their services—and particularly thanked Messrs. H. Thornton and Wolloff, the organisers of the concert. Mr. Ernest Rendall supported the vote of thanks on behalf of the staff. The Secretary thanks all supporters, and particularly Brighton and Burton centres for subscriptions.

Birmingham.—The Birmingham and district staff on May 4, unanimously passed the following resolutions at a general staff meeting convened by Mr. J. S. Rhodes, at which Mr. R. U. Tucker acted as chairman:—

1. "That a Benevolent Fund be formed for Birmingham and district to be contributed to by members of the staff."

2. That a Telephone Class for the summer months be started at once with a view to developing into a Telephone Society in the coming autumn.

The Birmingham and district staff are intending to visit Arley for the annual picnic which will take place on Saturday afternoon, June 23, 1906. The Wolverhampton and district staff will join in this gathering.

Head Office Stores.—The third annual summer outing organised by the members of the staff of Head Office Stores ("instruments and stationery") and Printing office is fixed for Saturday, July 21. The *locale* chosen is Windsor, and the programme includes the journey down and back by rail, an after noon among such sights and amusements ashore and afloat as the royal borough and royal river afford, with a "knife and fork" tea as the *pièce de resistance*. The success which has attended former outings makes it absolutely certain that nothing but fine weather is needed to make the forthcoming one a thoroughly enjoyable occasion, and the committee wish it to be known that a hearty welcome will be given to any members of the staff (Head Office or district), outside the organising association, who would like to join the excursion. The inclusive amount which each participant will be called upon to contribute is not to exceed 4*s*, and the General Secretary (Mr. W. H. Fishley, Stationery Stores) will be pleased to afford any additional information which may be desired.

Edinburgh.—*Ampère Golf Club.* The first foursome (hole and hole) competition was played over Saughton Golf Course in April. Messrs. H. V. Main and J. Crear (minus 2) carried off first honours, defeating Messrs. W. Knox and C. L. Stewart (plus 1) in the final round.

Belfast.—In the May issue it was stated that the Football Club was organised in 1906. This should read 1904.

Brighton Cricket Club.—A cricket club has been formed among the Brighton staff, Mr. J. W. Strip of the District Office, and Inspector Johnson, taking a leading part in its inception. The officers are not yet elected, but Mr. Johnson will probably be selected as captain. On Saturday, May 19, this club played its first match, their opponents being the employees of Brighton Society Press. The match was played on the Brighton Race Hill, resulting in a win for the printers, who scored 72 to the National Telephone club's 52.

London.—The first outing in connection with the Metropolitan staff, took place on Saturday, May 5, to Ashtead Woods, Surrey. The weather was very fine and an enjoyable time was spent; 62 made the journey, 28, for whom carriages were reserved, by train, and 34 cycled down. The whole party were photographed by Mr. Newdick (Contract Department). After tea a meeting was held, at which the following were elected to arrange similar outings throughout the season; Miss Bishop (Croydon), Miss Fagg, (Salisbury House), Miss Izant (Gerrard), Mr. F. J. Fagg (Salisbury House), Mr. Gallard (Western engineers), Mr. Knapman (Metropolitan engineers), Mr. Hayward (Battersea engineers), and Mr. A. W. Heap (Salisbury House), secretary. A concert and dance were arranged in the evening, and the party eventually reached Waterloo, at 10.20 p.m. The next outing is on May 26 to the Glyn Hotel, Ewell, and on June 16 a launch trip is being arranged from Richmond to Sunbury. Further notice will be given of these. The support of all the staff is requisite to ensure the success of these outings. All information can be obtained from the secretary, A. W. Heap, Chief Accountant's Department, Salisbury House.

Southampton.—A very successful smoking concert was held by the engineering staff on May 16. Various musical items being supplied by members of the gangs, some of which showed a marked musical ability.

LOCAL TELEPHONE SOCIETIES.

Glasgow.—*Telephone Society* (Glasgow and West of Scotland districts).—On the afternoon of Saturday, April 28, a large number of the members of the society and others of the Company's male staff visited the Technical College in George Street, Glasgow, and through the courtesy of the Professor of Electrical Engineering, Dr. Magnus Maclean, had the privilege of an instructive and interesting tour of the building. Dr. Maclean personally conducted the members through the spacious structure, visiting in turn his laboratories and workshop, lecture rooms, examination hall, etc. The up-to-date equipment of the laboratories especially had a strong attraction for the visitors, and Dr. Maclean was most painstaking in exhibiting and describing the apparatus. From the roof of the building, towering over the city, down to the basement with its three large ventilating fans and heating apparatus, the interest of every one was fully maintained. In the unavoidable absence of Mr. W. A. Valentine, the society's president, a vote of thanks to Dr. Maclean was proposed by Mr. Wm. Allan, vice-president, and heartily accorded.

RESCUED BY TELEPHONE.—AN ISLE OF WIGHT INCIDENT.

A REMARKABLE rescue of three persons off the Isle of Wight is reported.

Admiral Baird was looking seawards from his residence at Wootton when he saw three persons clinging to the upturned keel of a capsized boat.

He telephoned to the coastguard station, and the coastguards launched a boat, and, after rowing hard for a mile, they reached the capsized craft, which was drifting out to sea. They rescued the three persons, provided them with dry clothing, and sent them home to Ryde.

ANNUAL STAFF DINNER.

THE thirteenth annual staff dinner of the Company was held in the Empire Rooms, Trocadero Restaurant, Piccadilly, on Friday, May 18, and was attended by a large number of the principal officers from all parts of the country. Mr. Wm. E. L. Gaine (General Manager) presided, and had on his immediate right Mr. George Franklin, the President of the Company, and on his left Mr. S H. Sands, the Vice-President. The guests included Sir James Fergusson, Sir Albert Rollit, and Sir James Woodhouse, M.P. (Directors), Lord Kelvin, Major Shepherd, Messrs. H. Fedden, A. St. G. Lawrie, D. Sinclair, H. Laws Webb, J. F. Bond, J. E. Kingsbury, P. Hammarskjöld, H. S. J. Booth, W. Compton Smith, H. H. Lawless, P. Schidrowitz, H. H. Gaine, T. Anns, Dr. Grosvenor, and A. N. Bromley. Amongst the chief officials present were Messrs. A. Anns, F. Gill, S. J. Goddard, W. W. Cook, C. B. Clay, C. J. Phillips, A. Coleman, J. C. Chambers, R. Shepherd, R. A. Dalzell, and F. Cowley. There were also present Messrs. R. Aitken, W. Aitken, F. Albany, P. Alderton, H. J. Allen, V. Alsop, W. H. Anderton, C. F. Ashby, J. Ashton, C. M. Bailey, V. Baldwin, F. H. Barber, W. Barnett, R. J. Bartley, H. F. Bates, T. A. Bates, A. H. Baxter, G. Bean, E. Beaumont, R. W. Bell, F. Bennett, R. C. Bennett, W. Briggs, W. Biles, E. L. Blake, N. L. Blockley, W. R. Bold, J. A. Bonathan, C. A. Bostock, J. W. Briggs, E. Brown, F. B. Brown, J. L. Brown, W. Brown, R. B. Bumiller, J. W. Campion, G. M. Carr, C. W. L. Carter, H. Chambers, W. Chandler, P. Chester, B. Cohen, P. Cole, J. O. Cooper, H. Corner, A. E. Cotterell, C. F. Crow, W. Cullum, A. L. Curling, P. F. Currall, H. M. Darville, F. H. L. Davies, H. Davis, H. Deane, A. Dearle, A. C. Devey, H. S. Distin, D. R. J. Downing, A. L. E. Drummond, P. Edmonds, J. F. Edmonds, C. Edwards, R. M. Ellerton, C. Elliott, H. Elliott, J. G. A. Ewing, C. E. Fenton, T. Fletcher, E. R. Foote, W. M. France, F. W. Francis, W. H. Frazer, D. B. Fulton, J. R. Gall, W. E. Gauntlett, E. J. Gillett, G. Gillmore, R. Gilmour, W. J. Gilmour, A. Gray, W. J. Gray, G. F. Greenham, R. S. Grosvenor, W. H. Gunston, J. H. Gwyer, W. Haimes, E. Hare, F. C. Hawker, E. J. Hidden, H. Higgens, F. G. Hives, F. Homfray, E. Hooper, G. Hooper, W. Howe, E. E. Ironside, T. C. Jenkin, F. K. Jewson, A. M. Kidd, F. G. A. Kiff, J. King, P. P. Kipping, H. Kirby, E. Laidlaw, A. R. Lamb, O. G. Lee, H. Legge, J. Lemon, W. A. Lonnon, F. A. B. Lord, L. H. Lowe, S. Maber, D. Macadie, W. Macaulay, A. Maclean, H. J. Maclure, G. Maddock, A. Magnall, A. Martin, G. A. McDonald, D. McIntosh, J. Mewburn, W. V. Morten, J. K. Murray, R. Murray, W. Napier, W. Noble, B. J. Ottewell, W. Padget, W. H Peacock, H. M. Pease, W. V. Pegden, A. Perkins, S. J Pharo, H. Phillips, H. S. Plymen, J. Poole, W. E. Potter, G. F. Pratt, E. L. Preston, L. Price, T. A. Prout, A. Pugh, W. F. Rathbone, H. Reid, C. J. Remington, T. C. Rhodes, F. W. Roberts, Thos. Rodger, W. J. Rogers, A. E. Ruddock, F. T. Rushton, C. W. Salmon, N. A. Saltmarsh, J. Scott, W. R. Senior, J. Shackleton, J. Shea, L. Shorrock, F. W. Shorrocks, C. H. Sibley, F. E. Sims, A. W. Smith, S. C. Smith, S. J. Smith, W. F. Smith, O. W. Stevens, J. D. W. Stewart, O. Stiles, J. Stirling, E. E. Stockens, J. H. Storrie, D. Stuart, F. Summarsell, C. H. Summers, H. B. Sutcliffe, F. Swarbrick, J. W. Swithinbank, F. W. Taylor, W. F. Taylor, G. Tennant, S. Thirkell, H. Thompson, A. T. M. Thomson, A. T. Turney, J. W. Ullett, W. A. Valentine, B. Waite, J. C. Walker, A. S. Wallis, F. E. Waters, J. K. Waters, A. Watts, B. J. Wells, W. E. Weston, J. T. Whitelaw, R. H. Williams, A. Williamson, E. Williamson, L. E. Wilson, C. S. Wolstenholme, C. C. Worte, C. G. Wright, S. C. Wyatt, and representatives of *The Times*, *Standard*, *Daily News*, *Daily Telegraph*, *Electrician*, *Electrical Review*, *and Electrical Times*.

After the usual loyal toasts had been proposed by the Chairman and duly honoured,

The CHAIRMAN, who was loudly cheered on again rising, said: Mr. President, Mr. Vice-President, my lord, and gentlemen, I now come to what I may call, at any rate, one of our principal toasts—the toast of "The National Telephone Company and the Board of Directors." (Cheers.) In point of fact, I think I may say it is two toasts rolled into one, and therefore if I trespass a little more on your time to-night than I generally do, I will ask you to forgive me on that account. A good deal has happened since we met in this room last year—it is not quite a full year, but only ten months ago. I told you then, as of course you knew, it being public property, that an agreement for the transfer of this great undertaking to the State had been arrived at with the Government, but at that time it depended upon the wisdom of Parliament as to whether or no that agreement was to come into force. Since we met last that agreement has come into force, and the policy of the State acquisition of the telephone service of the country has been finally settled. That being so, it is our duty, consistent, of course, with the proper interests of our Company, to do all we can to work in harmony with the Post Office—I might suggest, to lead the Post Office into the right ways of working—(laughter)—and to so arrange that the ultimate transfer of this undertaking to the State may go through smoothly and with the least possible inconvenience to the public. In connection with that the personal note comes in. When we met last year at this festive board, we met under some difficulties. We were all labouring under some anxiety. As I told you then, your Board of Directors had done all that men could do to induce the Goverment to make a fair and just arrangement as regards this great staff, but up to the point of the agreement being come to, without any marked success. Now, fortunately for you, by judicious combination you were able to obtain the ear of Parliament, and I am bound to say that the staff, in the evidence which was laid before the Select Committee of the House of Commons which sat to consider the agreement, made out a strong and an extremely good case, and you were fortunate enough to secure a report in your favour from that Select Committee, with the result that when the report came to be considered by the House of Commons the Government gave way and gave fair terms, reasonably fair terms, to the bulk of the staff. In fact, I may say to all of the staff (with the exception of a limited few of us, and as regards those few, in our leisure moments, if we have any, we are seeking out the most picturesque and salubrious workhouses in the country where we may hope to spend our declining years)—(laughter)—to some extent, I think, you realised the proverb that, "God helps those who help themselves," but I do want to impress upon you, because I feel it very strongly, and it is within my own personal knowledge, that you owe a debt of gratitude to your Board of Directors for the effort which that board made in this matter, which efforts did contribute in a large measure, in my opinion, to the result which was ultimately obtained. (Cheers.) Now I come to a few remarks upon what our progress has been during the past twelve months. I am not going to give very many figures on that to-night, but there are always a few—I hope I shall not bore you—which are a little interesting. During the—I cannot say twelve months, because we met later last year than usual, and it is only about ten months since the date of our last annual dinner—but in that ten months the progress has not been bad. We have now 1,228 exchanges working throughout Great Britain and Ireland, the increase in the exchanges having been 73. In the same time we have increased our subscribers' stations by nearly 50,000, and when the twelve months is completed I shall be disappointed if it is not at least 60,000. That is a record increase. On that basis we shall have increased, in the twelve months, the whole of our *clientèle* by something like 15 per cent. We number now 378,000 subscribers' stations in Great Britain. The number of messages are getting so astounding that I am almost afraid to mention them now. They have risen to 1,052,000,000 in the year, being an increase in the ten months of nearly 60,000,000 messages. (Laughter.) Formerly, I have generally referred to the telegraph service, but the poor, unfortunate telegraph service is so hopelessly in arrear that I think I am going to give them up. (Laughter.) We have very often read in the newspapers, and heard before Committees of Parliament, and in the debates of town councils and other places, that this country is greatly behind all other countries in the world in the matter of the telephone service. I have some rather new figures here which I am a little anxious to get rid of. These are figures, official figures, of the development of other European countries up to Jan. 1 of this year. That is pretty nearly up to date. There are one or two interesting comparisons which can be made. I take ten countries—Austria-Hungary, Belgium, Denmark, Holland, Italy, Norway, Portugal, Russia, Spain, and Switzerland. These countries

combined have a population of 288,000,000 of people as against 42,000,000 in this country, but I find that in this country we have 30,551 more telephone stations than all those countries combined. In other words, our development is 7·2 per cent. greater than the development of all those countries put together. To get the nearest number of telephones of European countries to Great Britain I have to take eight countries, and these countries include France, Austria-Hungary, Belgium, Holland, Denmark, Norway, Portugal, and Switzerland, and even then we are 7,331 telephones to the good. I ought to tell you that for the purpose of these figures I have included the telephones supplied by a few competitors that we have—I do not think they make a great deal of difference—but it is only fair to say they are included. We have heard in times past, and we may again for all I know, a good deal of Stockholm and the Scandinavian countries. The Scandinavian countries are Sweden, Norway, and Denmark, but I am just going to throw in Belgium, Holland, and Switzerland, and when I have done that I find Great Britain has 105,000 telephones more than all those countries put together. The only country in Europe that can stand on the same platform with ourselves is Germany, and Germany, with a population of 58,000,000 have telephones to the extent of 10·2 per 1,000 of the population against 10·15 per 1,000 of the population of Great Britain and Ireland. (Cheers.) I don't know whether I am boring you—(no, no)—but you must stop me if I am. I have one or two more interesting figures—interesting to me at any rate. If you leave out the three countries of France, Germany, and Switzerland, there is no European country that has as many telephones working in the whole country as London has. London alone—I mean the telephone area of London—has nearly as many telephones with 6,000,000 of people as the whole of France with 39,000,000, as the whole of Sweden with about the same population, as the whole of Austria-Hungary, Belgium and Holland combined with a population of 60,000,000, and as the whole of Switzerland, Norway, and Denmark combined with 10,000,000. Well, gentlemen, although I am the last to suggest that the development of the telephone in this country has been what it might have been if we had had a fair chance—(hear, hear)—I do not think those figures are so conclusive against our enterprise in this country as we are often led to believe is the case. (Cheers.) I am, however, bound to say, there is another side to the picture. I had the privilege once again of going out to that great country on the other side of the Atlantic last autumn—America. There you do not use the telephone, you breathe it. (Laughter.) And they are not the telephones of the cheap and nasty description which a good many of the unthinking advocate for this country. It is the highly arranged and scientifically developed service which really fulfils the public requirements in that country, and which is adequately paid for and is worth paying for. We cannot claim to have developed here the telephone service to anything like the same extent as they have done in America. Well, you will ask me, why? I answer, Because, in the first place, owing to that early decision of the courts of law which said that the telephone, then newly invented, was a telegraph which had been invented years before, we have been under the heel of Government control (Hear, hear.) Because, again, for years we never had, I was going to say adequate, but we never had any powers for the purpose of putting down our plant; and also because, until the agreement of last year, there has never been any settled policy by any Government which has ruled this country. (Hear, hear.) Now that the telephone policy of the country is a settled policy, I do hope, if I am permitted to live for the next few years, to be able to see what this Company, and what you, the staff of this Company, can do to develop the telephone service of Great Britain as it ought to be developed. (Cheers.) The development of the telephone in America is something astounding. We have, I think, amongst us to-night a good many of our contract managers from different parts of the country—managers of contract departments—and I am going to make their mouths water, although that may sound rather ungracious, considering what you have in front of you. (Laughter.) When in America, I saw a contract which had just been signed by a great store firm in Philadelphia for the establishment of a private branch exchange in their new stores with 2,300 telephones. If any of you Contract Managers come to me next week with such a contract it may be to your advantage. (Laughter.) I found in the different cities throughout the States that in those stores—large places corresponding to Whiteley's and the Army & Navy Stores in this country—I constantly found that they had 400, 500, and 600 telephones throughout the building. I suppose in process of time that will come to us, but one naturally asks us why is it that it has not come to us before. Is it because we Britons are too conservative or not receptive enough to new ideas and methods? Well, we are a little given that way, but I do not think that that is the answer. I think the answer is to be found in our method of charge. As long as we continue to give an unlimited service for a fixed price, to my mind we shall not develop on the lines that we ought to. In all those American stores, and it is not only in the stores but in the hotels and a vast number of other places, the rates in America are based, as they ought to be based, upon the amount of use that is made of the service, and the result is that the hotel proprietor or the store proprietor can buy his calls at a cheap rate from the company and he can sell them retail to his customers at a higher price and so make a profit. Until we adopt a similar principle in this country we shall not have, in my opinion, the development that we ought to have. Now I pass to another subject. There is a new enterprise which, since we met here last year, we have started. I refer to our JOURNAL. (Hear, hear.) Well, now, the JOURNAL is a newspaper by the staff and for the staff. I think it is a new departure which is to be welcomed. (Hear, hear.) I have heard it said that there are many ways of losing money, but that to start a newspaper "is the devil." (Laughter.) Gentlemen, I have great hopes of our JOURNAL. (Hear, hear.) The first two issues, I think, have been excellent, and if the tone, the standard, and the excellency of those issues can be kept up I am perfectly certain that we shall make a success of it. (Hear, hear.) But it depends upon you. I commend it to your notice. I commend it to your effort. So much for the Company. The next part of my toast is the Board of Directors. (Cheers.) Since we met last year great changes have taken place. We have lost Sir HENRY FOWLER, our Chairman, who felt that, having accepted high office in His Majesty's Government, that position was incompatible with retaining the presidency of this Company. I am sure we all regret his loss. (Cheers.) I know that he regretted the necessity for leaving us. Sir HENRY FOWLER, besides proving a most able Chairman at a time of great stress in this Company endeared himself to all who with whom he came in contact by the kindliness of his disposition. (Hear, hear.) All of us who knew him feel that we are poorer by his retirement. I should like to be allowed, if I might, to send him a message to-morrow morning on behalf of the staff assembled here expressing our regret at the loss we have sustained by his leaving us. (Cheers.) Well, whilst we speed the parting we must welcome the coming. *Le Roi est mort, vive le Roi!* In Mr. FRANKLIN the board has secured a worthy successor to those who have preceded him. If he were not here I could say a great deal about him, but even a Yorkshireman, if caught young, can still blush—(laughter)—and I know he was caught young. I will only say that if he is spared and continues to enjoy good health, he has before him in connection with the ultimate transfer of this undertaking to the State, a work of no ordinary character, and one requiring no ordinary qualities. (Hear, hear.) That he possesses the requisite qualities and that he will rise to the height of his responsibilities I have not the shadow of a doubt. (Cheers). Now all that I have said or could say of Mr. FRANKLIN, I may equally say of our esteemed friend Mr. SANDS, our Vice-President. (Cheers.) Mr. SANDS is one of the oldest Directors of this Company, and I am sure that no appointment could have been more fitting or more pleasant to all the members of the staff of this Company. (Hear, hear.) Of the board generally, I can only say that the Company is exceptionally fortunate in having its affairs controlled by men who are as able and capable as our Directors are. (Cheers). I have had a telegram from our old friend, Sir CUTHBERT QUILTER, in which he says that on the ground of health he is unable to be here, and he adds, "Please express my regret. My interest in the old Company and staff warm as ever." Unhappily, Lord HARRIS, who would otherwise have been with us, is out training with his yeomanry, and others from one cause or another are unable to be here, but we fortunately have with us our old friend Sir JAMES FERGUSSON whom we are delighted to see. (Cheers.) Sir JAMES WOODHOUSE—(cheers)—and, although I mention him last, not the least, Sir ALBERT ROLLIT. (Cheers). Now the task which is before the

new President, the new Vice-President, will be all the easier if they have at their backs a loyal and a willing staff. I think I can assure them that they have such a staff. (Cheers.) And now I have kept you quite an undue length of time, and I will only ask you now to drink to the toast of "The National Telephone Company and the Board of Directors, and I couple with it the names of the President, Mr. FRANKLIN, and of the Vice-President, Mr. SANDS." (Cheers.)

The toast was received with enthusiasm.

Mr. FRANKLIN, in reply, said: Mr. Chairman, my lord, and gentlemen, coming again once more to your hospitable board I am reminded of a number of previous occasions when it has been my good fortune to be with you and of the pleasant evenings I have spent among you, and I can recall the fact that upon several of those occasions I have left your board speechless—(laughter)—I mean, of course, that I left it without having had to make a speech, whereas now I find myself entirely in a different position, a position of greater responsibility and less freedom. My difficulty is none the less by reason of the fact referred to by your Chairman that owing to the—shall I call it accident?—of the General Election, we have had the misfortune to lose our President. I agree with every word the Chairman has said about the loss that the Company has sustained by the resignation of Sir HENRY FOWLER, and I am sure every member of the board will agree, too, that the ripe experience and the wisdom of Sir HENRY are a great asset to any Government and to any Company. (Cheers.) I have now to respond to the toast of the Company—a toast which has always been received and responded to at this board, as it ought to be, because I know of no other audience equally numerous where it might receive the same very gratifying reception as it always receives here. The National Telephone Company is, perhaps, the most abused and the most threatened of all public companies—the most undeservedly abused and the most undeservedly threatened. Since the accident of the legal decision to which your Chairman referred, since the fact that the telephone was declared a telegraph, and when the State created the Company by licence, there has, as the Chairman has said, been no settled policy with regard to the telephone in this country. We have had alternately hot fits and cold fits. We have indulged in competition, we have gone back again to monopoly, showing altogether a complete misunderstanding by Parliament, our creators, of the position we were destined to fulfil, and it was not until last year that a definite and final policy, shall we say, was resolved upon—a policy which eventuated in the agreement approved by Parliament last August. And here I ought to say a word congratulating the staff upon the efforts they made and the way in which they backed up your excellent General Manager and the Board of Directors in impressing upon the Committee the necessity of doing for the staff a simple measure of simple justice—(hear, hear)—and I venture to say the staff are to be congratulated upon having been able to do so much for themselves. As to the Company, what is to be its future, and so forth? None can tell, but this one does feel, that, as in the past we have been crippled by uncertainty, now that the uncertainty no longer exists there seems no reason, at all events, why we should not be able to go forward to greater development, and to do that which we are destined to do—that is, to satisfy the public needs with regard to the telephone service. (Cheers.) I know of no organisation and no staff so well capable and so devoted to the carrying out of that destiny. I venture to think that when 1912 comes and when the Government have acquired the staff of the National Telephone Company, not the least of all the assets taken over will be the staff of this Company. (Cheers.) The experience, the ability, and the devotion of that staff will be as invaluable to them as I hope they will be to the Company during the few remaining years of the licence, in doing what they can to develop this telephone business and to make up for the lost years which have been thrown away by reason of the changes of policy on the part of Government from time to time. I can only say with regard to the Board of Directors that they require no assurance from the General Manager that they have the devotion and the ability of the staff of this Company behind them. For many years past, some fourteen or fifteen now, it has been my good fortune to work with a number of the staff in different parts of the country. I have watched the work they have done for the Company, I have appreciated it, and I venture to say that my colleagues on the board have appreciated that work also. What is to be the extent of our future development? We know that during past years we have doubled our business in about seven years. That was during the troublous times of uncertainty. Who shall say that during the next five or six years we shall not be able to more than double it—to treble or even to quadruple the number of our subscribers during that time. Depend upon it, it is neither in the interests of the Government nor of the shareholders that we should mark time or that we should stand still, but it is, on the contrary, vital to our shareholders and to the Government and the public that we should do all we can to develop the telephone service as it ought to be developed. (Cheers.) I believe that we have the staff and the ability behind us, but whether we can express it in any adequate numerals or not I do not know. I was interested the other day to read that there had been a discovery in the tombs of the Kings in Egypt, where your General Manager went a few years ago, of an old system of numerals. One was indicated by a vertical line, and so they went on in tens, copying the example of primeval man who started the decimal system by counting his toes, and they went on until they reached the million, which was expressed by a man in an attitude of amazement. I can only say that, whether the future is to be expressed in the number of stations, or the amount of capital expended, or in the revenue of the Company, it rests with you to back up the Board of Directors in order to show to the General Manager that it is possible to indicate by any number of men in attitudes of amazement what the future of the Company shall be. (Cheers.)

Mr. SANDS: Mr. Chairman and gentlemen, last year was the first year it was my privilege to be with you on one of these occasions, and I can only say that it is with very great regret that I look back upon the many dinners you have had before at which I was not able to have the pleasure of being present. I am an old servant of the Company and I have done in the past the best I could for the interests of the shareholders, for the interests of the staff, and for the interests of the public. I think that is a fair way of putting the thing to you, because the people who find the money to back up the enterprise ought to have, with the Directors, the first consideration. Second, all those who help to develop it, and they are you. I feel most emphatically that without your assistance and the way it has been given, we could never have given the satisfaction to the shareholders that we have given in the past. I am quite confident that in future you will make that same effort to develop the business to what, in my opinion, should be a practically unlimited extent if we were only allowed another twenty years' existence. As we cannot hope for that we must make the best of the few years we shall have. (Hear, hear.) Nothing I may say has given me greater confidence that you will do it with ability and success than the fact that since we last met you have started on your own account a little journal, which will grow, I believe, to be as big and as important in the telephone world as its best wishers could desire. It is a marked proof to us as Directors that you are in earnest, as you ought to be, in promoting this great undertaking. I feel we owe you a debt of gratitude in making such an effort, and I feel sure, too, that it will be for your benefit and for the benefit of the Company. (Cheers.)

Mr. T. A. PROUT, in proposing the toast of "Our Guests," pictured each of them as the happy possessor of every imaginable grace and virtue, and suggested that as one looked around the tables and saw a face of unusual charm, it might be presumed that you had alighted on a guest. He wished he could convey to Lord KELVIN, one of the number, some idea of the admiration and affection felt for him by the staff of the National Telephone Company; and, although Lord KELVIN was happily in many senses ever young, yet the fact that he should come out to this gathering to-night, in spite of his 82 years, filled the telephone workers present with appreciation. His lordship's great career formed a real inspiration to every one of them, and it was a high honour to have the presence to-night of the close friend and fellow-worker with the great JOULE. Lord KELVIN's high attainments in mathematics, electricity, geology, and navigation, and the great usefulness of his syphon recorder, mirror galvanometer, and many most beautiful electrical measuring instruments were well known to them. Although Lord KELVIN arrested the attention of the scientific world so long ago as 1841, at the early age of seventeen, by his

learned treatise on the "Mathematical Theory of Electricity," he was still in 1906 actively promoting the interests of science in many ways, as for example by having just consented to become the President of the Glasgow Section of the Institution of Electrical Engineers.

Mr. PROUT went on to say that he would like to assure Lord KELVIN that if, with the spread of telephony, it should happen that a telephone exchange should one day be built on the site of his birthplace in Belfast, or some spot at Glasgow or elsewhere, with which his honoured name has been connected, it would be looked upon as a privilege by a future generation of telephone employees to commemorate the fact, as we may shortly do, the associations of the revered MICHAEL FARADAY'S place of worship in Barnsbury, with the site of the Company's North London Exchange. In Sir ALBERT ROLLIT, too, another guest, they had a delightful personality of high intellectual attainments, a gold medallist of the University of London, with an international reputation in commerce and affairs, and so gifted in eloquence and wit, that it had become an annual delight of the staff to hear him speak at their dinner.

Mr. PROUT asked hearty acceptance of the toast of "Our Guests," and coupled with it the names of the two gentlemen mentioned.

The toast was most cordially received.

LORD KELVIN, *in responding*, said: I appear before you this evening in a threefold capacity—as a retired member of the staff of the National Telephone Company, as a not retired shareholder—(laughter)—and as one of the guests whom you have made so happy. As one of the guests I desire to thank you for the great pleasure we have had this evening. We have listened with intense interest to the brilliant speeches that we have had from Mr. GAINE, and from the President and the Vice-President, describing the history of the National Telephone Company in the old days of struggle, its present position, and its prophesied history—the great things it is to do in the next five years. I believe that the number of the staff now is approximately 15,000. What will it be when you all enter the service of the Government under the Postmaster-General? If you were sending a message this evening to Mr. Sydney Buxton, it would not be in the words of the old Roman gladiators to the Roman Cæsars, *Morituri te salutant*. On the contrary it would be, "We are living now, and we mean to live till "well on after 1911. (Cheers). We mean to work well for the "National Telephone Company during the next five years, and then "become as loyal servants to the State, as loyal and as good workers "and as useful servants, as we have been to the Company." I think the Post Office and the country may well feel that a very great gain is coming to it. (Laughter.) That the undertaking which has been so splendidly carried on so far, and will, we believe, also be carried to still greater success in the next five years, will after that be carried on, though perhaps under new conditions, yet in the same spirit and with the same efficiency, zeal, and vigour as have been shown from the foundation of the Company. I have been all along interested in this Company. Indeed, I was a member of its predecessor, and particularly of the United Telephone Company which existed before the formation of the National Telephone Company, and I have a clear recollection of the chequered history of this Company's career which has been alluded to by your Chairman and Mr. FRANKLIN. But "all's well that ends well," and we are now looking forward to a brighter future, we hope. I trust we look backward to what has taken place with a forgiving spirit. We have suffered injuries, but we have fought boldly and we have come through our difficulties triumphantly, and I think that we can now afford to look back on the troublesome past without undue feeling, and regard the future with hope and confidence. I thank Mr. PROUT for the kind way in which he has spoken of me in proposing this toast, and I also thank you all for your kind reception of it. I wish perpetual success to the National Telephone Company. I wish its name could be continued after its business has been transferred to the Government. It will be no less a national company than it is now, and I should be very glad to see its name continued officially —the National Telephone Company of Great Britain. (Cheers.) In the name of the guests I thank you warmly for the pleasure you have given us this evening. (Cheers).

Sir ALBERT ROLLIT said the Chairman had made an unprovoked attack upon Yorkshiremen in saying they could not blush, the truth being that they blushed white, which was, in fact, the heraldic basis of the White Rose of York, which their modest blushes reflected. (Laughter.) Next, the Chairman in calling upon him to add to Lord KELVIN'S speech had asked him to perform what the Church in one of its 39 Articles called a work of supererogation, the vanity and arrogance of which might be punishable by purgatory, even if the offender might not go further and fare worse. (Laughter.) He was, however, proud to be coupled with Lord KELVIN in any duty, with a name which was familiar in the greatest triumphs of both pure and applied science, in the discovery of the most abstract truths, and in such practical applications of science as the mirror galvonometer and the deep sea sounding machine. As a student, Lord KELVIN helped him to grasp that key to modern science, the doctrine of the conservation of energy. The immutability of the laws of matter and energy was a paramount principle. NEWTON'S "Laws of Motion" governed both the molecule and the motor, and ignorance or defiance of them produced the inevitable smash which was the difference between the "quick" and the dead—between the motor and its victim (Laughter.) Still, mobility was the matter of the moment, and even Scripture was falsified; for could not the leopard change its spots?—could it not move from one spot to another? (Laughter.) In their own field of electricity the occasion was most interesting and suggestive. In America the memory of BENJAMIN FRANKLIN was being celebrated. His identification of lightning and electricity, through his kite, was a first great step, after some 2,000 years, since the Greeks discovered the electrical properties of *elektron* or amber. It was a coincidence that in their new and able Chairman, the Company had also its FRANKLIN, who he felt sure, as one of his colleagues on the Directorate, would, while not flying kites—(laughter)—most ably carry on their scientific and practical work, until at last he too would pass into the calendar of the scientific saints surmounted by a nimbus of lightnings and with a crown of switchboards on his head. (Laughter.) He was sure their new Chairman would do all in his power to encourage their staff to emulate BENJAMIN FRANKLIN, in using every opportunity of scientific training, in which both Germany and America were in advance of us. Seventy years before the State did its educational duty to the people, Prussia, under her great minister STEIN, at a moment when the heel of NAPOLEON was upon her neck, after the battle of Jena, resolved to make up intellectually what she had lost materially, and this was the genesis of that system of national education which had been one direct factor in the commercial and competitive rise of Germany, and, happily, at last, London was to have its Charlottenberg as a college of the Metropolitan University. (Hear, hear). But, alas, we passed Education Act on Education Act without materially advancing education itself. One cause of this was styled the religious difficulty, religion being invoked by some as a saviour, by others as a spectre. Both recalled scenes during the "No Popery Riots" of early days. If a Protestant mob passed a house and "No Popery" was not displayed, it smashed the windows; if "No Popery" was written up, the Roman Catholic mob did the same thing; so for the sake of his windows and of peace the clown GRIMALDI chalked on his doorpost "No religion." To this it might come now, unless reason and justice prevailed, or perhaps the situation might call for the *reductio ad absurdum* of the policeman who arrested a sleepwalker in his pyjamas, upon which the citizen said, "I'm only a somnambulist." "I don't care," replied the constable, "what your religion is, you mustn't walk about the city in these garments" (Laughter.) What a pity that more controversialists would not realise the sarcasm.—Men will work for religion, fight for religion, die for religion, anything but live for religion. (Cheers) However, there are hopes for electrical education, for he who ran might have read the following in the daily newspaper the *City Times*:—

> "Underground wireless is the latest development in telephony. Now what is underground wireless? Just the same as overhead wireless, only in the one the wires they don't string overhead, and in the other wires they don't use

they don't lay underground. Oh, that's it, is it? I knew it must be something like that." (Laughter.)

Now, he thanked them for their hospitality, to which he had added some crude remarks; still they were better than some of the *cursory* remarks heard at times through the telephone—(laughter)—when for instance anyone was cut off, which reminded him of the refrain of the song they had just heard, "The Lost Chord," with the variation to "The Sound of the Great D—n." (Laughter.) To hospitality they had added good feeling and fellowship. Dining was democratic—they all did it—and to-night they had all lived at the rate of £10,000 a year for four hours. (Laughter.) Sometimes there were difficulties in dining, as when at *table d'hôte* in a far Western State of America he asked his opposite neighbour, "Will you kindly cut me a piece of that pie without any of the paste?" and received the reply, "And who the deuce do you think's going to eat your paste, eh?" (Laughter.) Now he should simply and silently sit down. (Loud cheers.)

Mr. J. STIRLING: Mr. Chairman, my lord and gentlemen, I have heard it said that it is possible to tell the distinctive nationality of an inhabitant of the British Isles by the manner in which he leaves a railway carriage. The Irishman jumps out before the train comes to a standstill. The Englishman waits until it stops, and collects his baggage and disappears. The Scotchman waits until everyone else has got out, and then looks under the seat and up on the rack to see if anybody has left anything. (Laughter.) Well, I am sure that if the toast which I have the privilege of submitting to you had been left unhonoured, something important would have been left out of our programme. I have heard the General Manager, at many of these annual dinners, tell us of the pride which he feels in his staff, and I think, gentlemen, that I can assure him on your behalf that we also feel a pride in him—(cheers)—and in the conspicuous ability and success with which he carries on the great business of this Company, and in the perfect organisation and achievement which has resulted from his labours—an organisation second to none among the industrial triumphs of our time. (Cheers.) I hope the General Manager will see a sufficient earnest of our loyalty to him in our efforts and in the work which we strive to do for the Company in our various districts; but, in addition to that, it is always a pleasure to us at these annual gatherings, when, for a very brief space of time, the service instructions cease from troubling and the metaphone is at rest, to assure him personally of the great regard and esteem in which we hold him—(hear, hear)—and the confidence we have in him to do the best for the interests of the staff who serve under him. I ask you to show that these are your sentiments by drinking heartily and cordially the health of our Chairman. (Cheers.)

The toast was received with the greatest cordiality.

The CHAIRMAN, who was again warmly cheered, said: Mr. President, Mr. Vice-President, and gentlemen, the rules have on this occasion been so frequently broken, like most of the other rules and service orders of the Company, that I have ceased to complain. I thank you most heartily for the toast which you have just honoured, and for the kind words in which Mr. Stirling proposed it. I candidly confess that this little annual sentiment passing between us is to me very gratifying. (Hear, hear.) The post that I fill is not a very easy one, and not the least of its difficulties is this—the feeling that one, perhaps, is not always doing justice. I was afflicted, if you like to call it so, by Providence with a strong sense of fairness and justice—(cheers)—and if I do not always succeed you must, I hope you will, take the endeavour for the deed. (Cheers.) I try at at any rate, according to my lights, to do justice in the position which I am called upon to fill. My speeches are not like telephone messages. They are not to be counted by millions—(laughter)—and I am not going to inflict another upon you to-night. I again thank you most heartily. I hope we may all have a prosperous year and that every one of us, with the will of Providence, may meet here again next year. (Cheers.) Gentlemen, we have had, I trust, a pleasant gathering and I wish you a hearty welcome next year. (Cheers.)

This concluded the toast list, and the gathering shortly afterwards dispersed.

NEWS OF THE STAFF.

Mr. W. HOWE, District Manager of Southampton, was presented on April 4 with a silver-mounted tantalus, suitably inscribed, together with a set of silver spoons for Mrs. Howe, from the staff of the district, as a token of their esteem and to mark the completion of his 25 years' service with the Company. The presentation was made by Mr. Gwyer, Local Manager, supported by the Chief Clerk, Mr. F. W. Richards, Mr. F. H. Huggins, District Office, Mr. F. Quin, Chief Inspector, and other officials. Mr. Howe expressed his appreciation, and the evening was concluded by a very enjoyable dance.

Mr. F. HOMFRAY, Local Manager, Watford, transferred to Local Manager at Windsor, vice Mr. H. A. Faulkner, transferred to Watford. Mr. Homfray was presented by the staff with a case of silver-mounted briar pipes on leaving Watford.

Mr. R. HARRIS has been appointed Inspector-in-Charge at St. Austell.

Mr. H. STRACHAN has been appointed Inspector-in-Charge at Penzance.

Mr. J. HAMSHERE, Local Office Clerk, who has resigned from the service, was presented by the staff with a nice case of briar pipes as a token of the good feeling that had always existed between the staff and himself.

Mr. A. FRADD, Cardiff district office, was presented by the members of the staff with a handsome marble clock, suitably inscribed, together with an oak biscuit barrel, on the occasion of his marriage, April 14, 1906.

Mr. E. L. HAGUE, Engineering Inspector, Birmingham has been transferred to Leicester in the same capacity. He was presented with a silver-mounted walking stick by his colleagues.

Mr. S. C. GOODWIN, Engineers' Department, Leicester has been transferred to Hanley as Engineering Inspector. He joined the Company at Leeds and has seen service at Wolverhampton. He was presented with an umbrella and an ebony walking stick by the outside staff as a token of esteem. Mr. PRICE, Local Manager, made the presentation.

Mr. M. MARSDEN, Service Inspector, Sheffield has been appointed Chief Electrican, Leicester.

Mr. J. AKED, who has recently been transferred from Wakefield to Darlington as Inspector-in-Charge, was presented with a gold watch chain subscribed for by the Dewsbury and Wakefield staff.

Mr. B. HEWITT, Inspector, Wakefield, on the occasion of his marriage, was presented with a handsome chair and pair of vases by the staff at Wakefield.

Mr. W. A. NICHOLSON, Inspector-in-Charge, Darlington, who has been appointed Local Manager at Middlesbrough. was presented on April 13, with a silver egg-stand, subscribed for by the members of the Darlington and Bishop Auckland staffs.

Miss LIZZIE MCGREGOR, Edinburgh, has been promoted to be Supervisor.

Miss F. HOUGHTON, Manchester, was promoted to Supervisor from Senior Operator, April 27, 1906.

Mr. H. ESCOTT, Chief Construction Inspector, Manchester, was married to Miss SENIOR, of the operating staff, on April 19, 1904. Prior to leaving the Company's service Miss Senior was presented with a dinner and tea service and other small mementos from the operating staff. On behalf of the electrical department, the District Manager, Mr. John Scott, presented Mr. Escott with a china cabinet as a token of the good wishes of his colleagues.

Miss FOWKE, Belfast, was promoted to the position of Supervisor in the month of April, and Miss MCCARTNEY to be Assistant Supervisor.

Miss B. ROBINSON, Senior Operator at Reading, was presented with a marble clock on the occasion of her wedding.

Miss E. M. HOLDEN, Senior Operator, Central Exchange, Liverpool, who entered the service in December, 1899, has resigned in order to get married.

Miss F. MATSON, Senior Operator, Wavertree, who entered the service in September, 1898, has resigned in order to get married.

Mr. T. ROWE, the District Engineer for Liverpool, completes 25 years on May 31 next, having entered the telephone service at Manchester in the old Lancashire & Cheshire Company on May 31, 1881.

Mr. W. H. HUGHES, Exchange Inspector, Liverpool, has resigned his position in the service in order to take up work in Canada. He was engaged in the Electrical Department of the Liverpool district for two years. Before leaving, he was presented with a travelling trunk by the Chief Electrician on behalf of the members of the staff.

Miss MCCARTNEY has been appointed Assistant Supervisor in Belfast switchroom, vice Miss FOWKE promoted to new Supervisor's position.

Mr. SYDNEY MCDOUGALL has been appointed Assistant Chief Inspector, Belfast, vice Mr. A. CONNACHER, who is at present in Derry supervising the fitting of the new common battery installation.

Miss M. NICHOL, Senior Operator, Sheffield, leaves the Company's service on May 31, to be married, after being an operator for over five years.

Miss ETHEL O. KAY, one of the Senior Operators in Argyle Exchange, Glasgow, left the service on April 19, and was married on April 27. The staff in the exchange presented her with a handsome brass standard lamp and shade.

Mr. W. F. RHODES, on the occasion of his leaving Canterbury for Ramsgate, was presented by his local staff, and the District Office staff at Canterbury, with a handsome silver teapot and silver biscuit box, with his monogram engraved on each.

Chief Inspector LEITHEAD, Plaisley, has gained first prize in Telegraphy and Telephony, and third prize in Electrical Engineering at the Glasgow and West of Scotland Technical College, Session 1905 and 1906.

Mr. G. EARDLEY, of the electrical staff, Bristol, was on the occasion of his marriage on May 14, presented with a handsome cruet, subscribed for by the general staff.

Mr. J. OVERTON EARDLEY, of the District Office, Bristol, was married on May 20, and was presented with a dinner and tea service and vases.

Mr. J. RADFORD, Chief Inspector, Bath, has been appointed to the new Inspectorship-in-Charge of Swindon.

Miss A. C. PINNELL, Supervisor, has filled the new appointment for Monitor

in the Bristol Exchange, and her place as Supervisor has been taken by Miss B. CLIFFORD.

Mr. F. J. GERRARD, of the Exchange Equipment Department, at Head Office, was, on the occasion of his marriage on April 25 last, presented with a combined desk and bookcase by the Engineer-in-Chief and his staff.

Mr. N. L. BLOCKLEY, late of the Engineer-in-Chief's Department, London, has left the Company's service to take up a position in the British L.M. Ericsson Manufacturing Company.

London Traffic Department.—*Promotions and Transfers during May:*

Miss A. TIMEWELL, Senior Operator, Holborn, to be Supervisor at Dalston in place of Miss B. WOOD promoted to Senior Supervisor in charge of Tottenham.

Miss C. HIGHAM, Senior Supervisor, Tottenham, to be Senior Supervisor in charge at Dalston.

Miss M. D. JOHNSTONE, Senior Supervisor, East, to be Clerk-in-Charge, East.

Miss A. CONWAY, Supervisor, Bank (late Clerk-in-Charge, Plymouth), to be Senior Supervisor-in-Charge at Croydon.

Miss F. DINGLE, Operator, Bank, to be Supervisor, Kensington.

Miss E. MEADOWS, Operator, Avenue, to be Supervisor, Deptford.

Miss B. COOPER. Supervisor, Deptford, to be Supervisor, Brixton.

Miss B. BRYDEN, Supervisor, Kensington, to be Supervisor, East.

Resignations of operators to be married:

Miss E. HOWARD, Senior Supervisor-in-Charge of Croydon. Miss Howard, who will be taking up her residence in South Africa, entered the service in May, 1892, and has had charge of Croydon Exchange since 1900.

Her sister, Miss F. L. HOWARD, is also leaving to be married on the 31st inst. She entered the service in May, 1893, and has been in charge at Sydenham since 1903.

Miss S. SPARROW, Operator, Hop Exchange.

Miss G. WHITE, Operator, Eastern Exchange.

Miss M. FARMER, Operator, North Exchange.

Miss E. BREWER, Operator, Gerrard Exchange.

Miss E. SMITH, Operator, Kensington Exchange.

Miss M. HAZELL, Operator, Bank Exchange.

Miss E. SARSON, Operator, Avenue Exchange.

Miss B. ATTER, Operator, Avenue Exchange.

Miss B. CAMPBELL, Operator, Avenue Exchange.

Miss C. BRADNAM, late Clerk-in-Charge of East Exchange, was married on April 14 to Mr. W. SANGAR at St. Mark's Church, Forest Gate. Miss Bradnam, who entered the service in 1892 and had held her position at the East since 1900, was presented on her resignation with a silver dinner cruet and a butter dish, subscribed for by the whole operating, electrical, and engineering staff in the East district.

OBITUARY.

We regret to record the following deaths:—

Mr. WILLIAM LYALL, Local Manager of Dublin, on May 20 after a short illness of four days, of pneumonia. He has been on the staff of the Company since the beginning of the year 1884, joining at Perth, and at the end of 1898 was transferred to Dublin to the position that he held up to the time of his demise. During his term of office here he endeared himself to every employee with whom he come in contact, for his genial nature and willingness to help anyone out of a difficulty. He leaves a widow and family of three. As a token of sympathy the staff has placed a wreath on the grave.

W. MCCOWAN, Boiler Attendant, Dublin, on the 10 inst., from asthma.

Miss N. RUTTER, Operator, Traffic Department, Paddington, died from rheumatic fever on April 3. Miss RUTTER had been in the service since 1902.

Mr. DANIEL BIDDLE, for many years Night Operator at Oxford. His unfailing courtesy and readiness to oblige had endeared him to both staff and subscribers.

A. TEMPSON, Faultsman, of Colchester, through internal complications. He was a well-known figure in the whole centre, and will undoubtedly be missed by many.

Miss S. HANDLEY died on April 29 last, after a lingering illness. She was six and a half years in the Liverpool service, commencing as an operator, and after two years was transferred to the "Trunk Fees Department,' in which capacity she proved exceedingly capable. Miss Handley had won the respect and esteem of all her colleagues, and her early demise is very much regretted.

WHAT THE COMPANY IS DOING.

TWELVE exchanges were opened during the month of May, bringing the total up to 1,229. They were Walkden (Manchester district), Filey (E. Yorks), Normanby, Loftus (Middlesbrough), Stanley (Dundee), Hirwain (Cardiff), Eastry (E. Kent), Newmilns (Ayrshire), Sutton-in-Ashfield (Nottingham), Menstrie (Stirling), Burnham (Thames Valley), and Ainsdale (S.W. Lancs.).

The increase in stations during the month of April was 3,735, making a total of 377,883 stations.

THAMES VALLEY.—New underground work is in progress at Egham and extensions of existing underground work are in progress at Ascot and Oxford.

Extension of existing underground work is about to be commenced in Reading, involving three miles additional cable.

TUNBRIDGE WELLS.—The underground extension scheme, which was mentioned in the last JOURNAL as having been sanctioned, was started on Feb. 26, and has made considerable progress. The scheme provides for nearly twelve miles of extra cable to be laid down, and for taking two additional 600 pair cables into the exchange, which will give ample accommodation for growth of business. Thirty-four additional distributing poles are being erected, which, together with those already existing, make a total of 84 for the town of Tunbridge Wells alone. The ducts have now been laid.

SEVENOAKS.—An underground scheme has also been sanctioned for this sub-centre of Tunbridge Wells, and the local authority has just granted the wayleave.

DEVONPORT.—The completion of the underground scheme is rapidly advancing. The new exchange, which was brought into use some two months ago, has proved very satisfactory. Negotiations are being carried on with the Great Western Railway with a view to running a cable across the famous Saltash Bridge, near Plymouth, in order to open up a new exchange at Saltash.

NEATH.—The Company has completed an agreement with the Neath Corporation for placing underground its wires within the Neath borough. A 300-line switchboard is already being installed (in a newer and much larger building) in place of the existing board.

MANCHESTER.—A site covering 1,400 square yards has been acquired for a new exchange. The buildings on the site are to be taken down and plans are under consideration for a new Exchange and District Office premises. Provision is being made for a 10,000-line exchange on the central battery system to start with, while a second 10,000-line exchange will be able to be accommodated in the same building when required.

Manchester "Central" which is already the largest exchange appearing in the Company's records is being extended to cope with the increase in business until the new exchange is ready.

CARDIFF DISTRICT.—Underground schemes are in hand at Newport, Barry, and Penarth, and applications for permission to lay underground are at present under consideration by the Cardiff City Council and the Merthyr Corporation. The Company have secured an order from the Cardiff City Council for the whole of the telephones required in their new Town Hall and Law Courts. Two central switchboards will be provided, one in the Town Hall and the other in the Law Courts, the rooms of the various departments being connected thereto and getting connection with the private lines and with other departments by means of the operator at the switchboard.

OPERATING SCHOOL, LONDON WALL.—The contractors have commenced the installation of the school equipment at London Wall. The equipment consists of nine "A" (subscribers') positions for common battery working, three "A" positions for magneto working, and four "B" (junction) positions.

SCARBOROUGH.—The installation of the new common battery equipment has just been commenced.

WORTHING.—A rather smart piece of work is to be carried out at Worthing, the Corporation having granted underground facilities on condition that the work shall be completed by the end of June. The contractors have started work, and unless anything unforeseen occurs this condition will be fulfilled.

SYDENHAM.—An order has been placed for extending the common battery equipment at this exchange by an additional 440 lines.

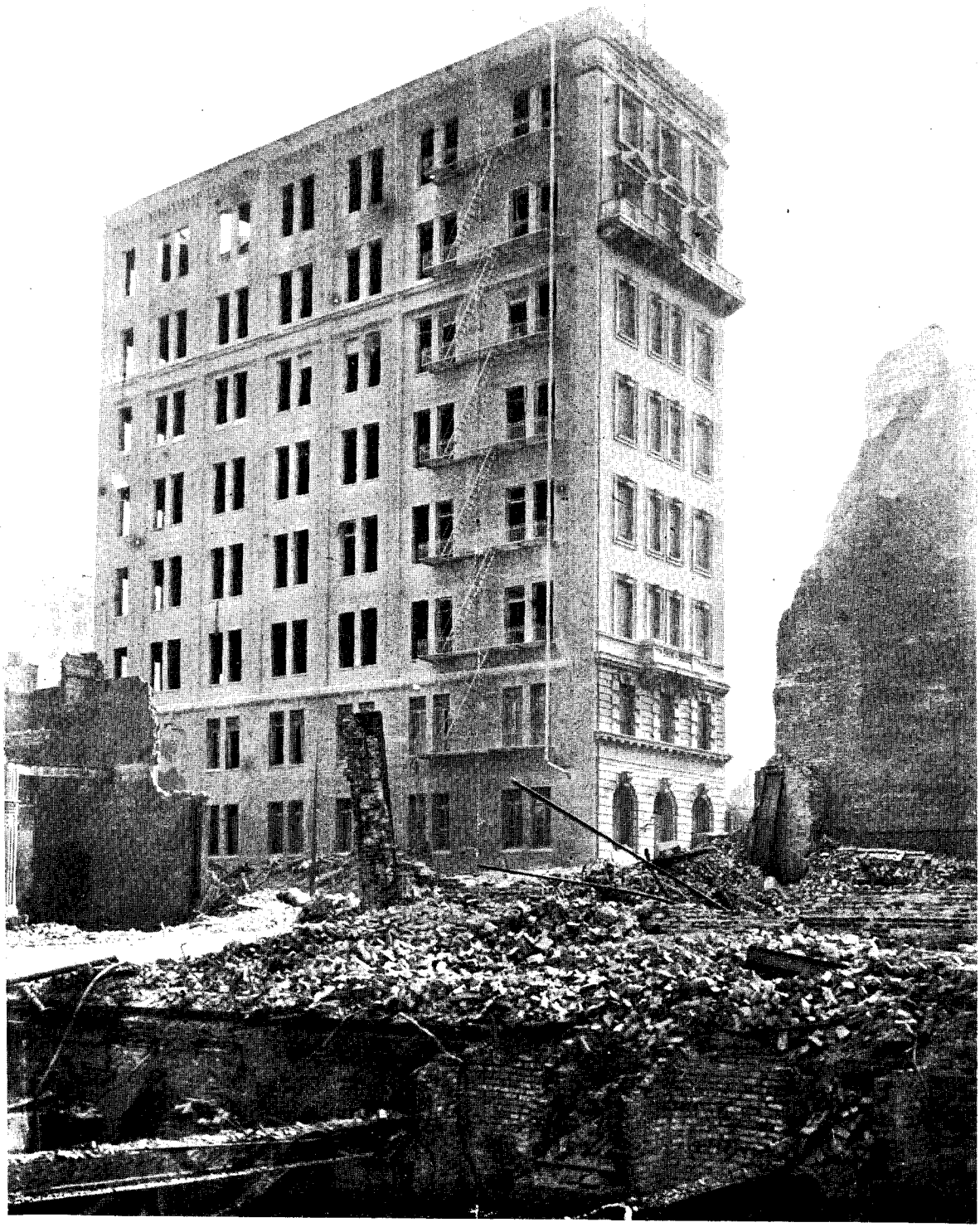
NORTH.—The work in connection with the extension of the common battery equipment at this exchange by 1,200 lines has just been commenced.

COLWYN BAY.—The main routes of this place are about to be put underground.

WORKSOP.—The laying of pipes and cables is now completed. A 357 pair cable leaves the exchange and branches to ten distributing poles.

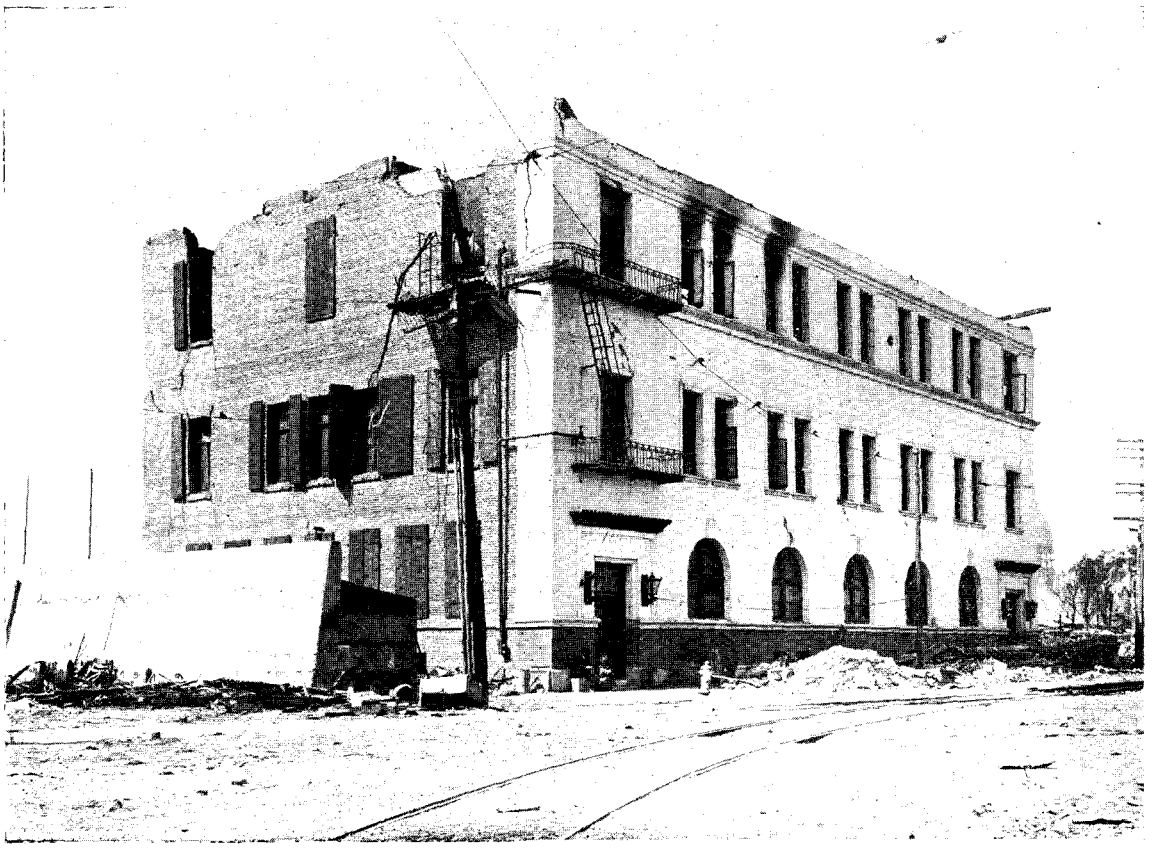
BRISTOL.—The laying of cement blocks and iron pipes in connection with the extension of the underground scheme is nearing completion. Ten miles of pipes and three miles of cement blocks have been laid. Up to the present moment about seven and a half miles of cable have been drawn in. The work of jointing the cables is being carried out day and night.

THE TELEPHONE AND THE EARTHQUAKE AT SAN FRANCISCO.



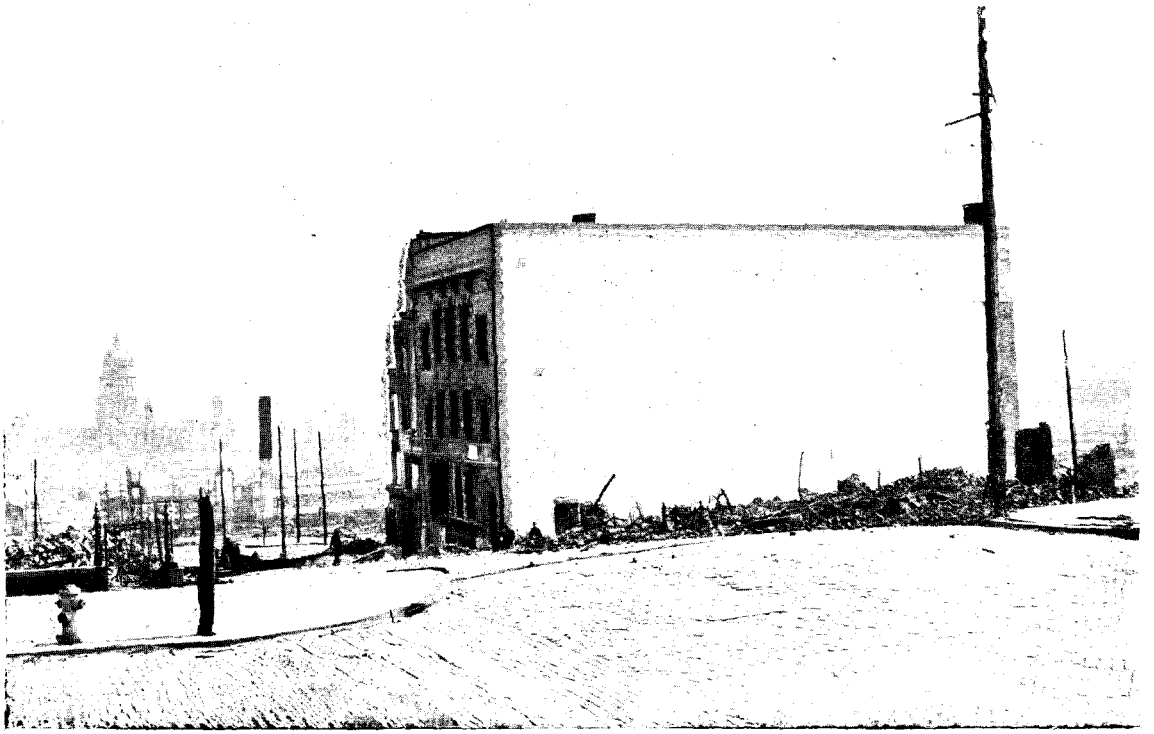
MAIN EXCHANGE BUILDING, SAN FRANCISCO, CALIFORNIA

A close study of this Building indicates it is in perfect condition as far as the Building is concerned.



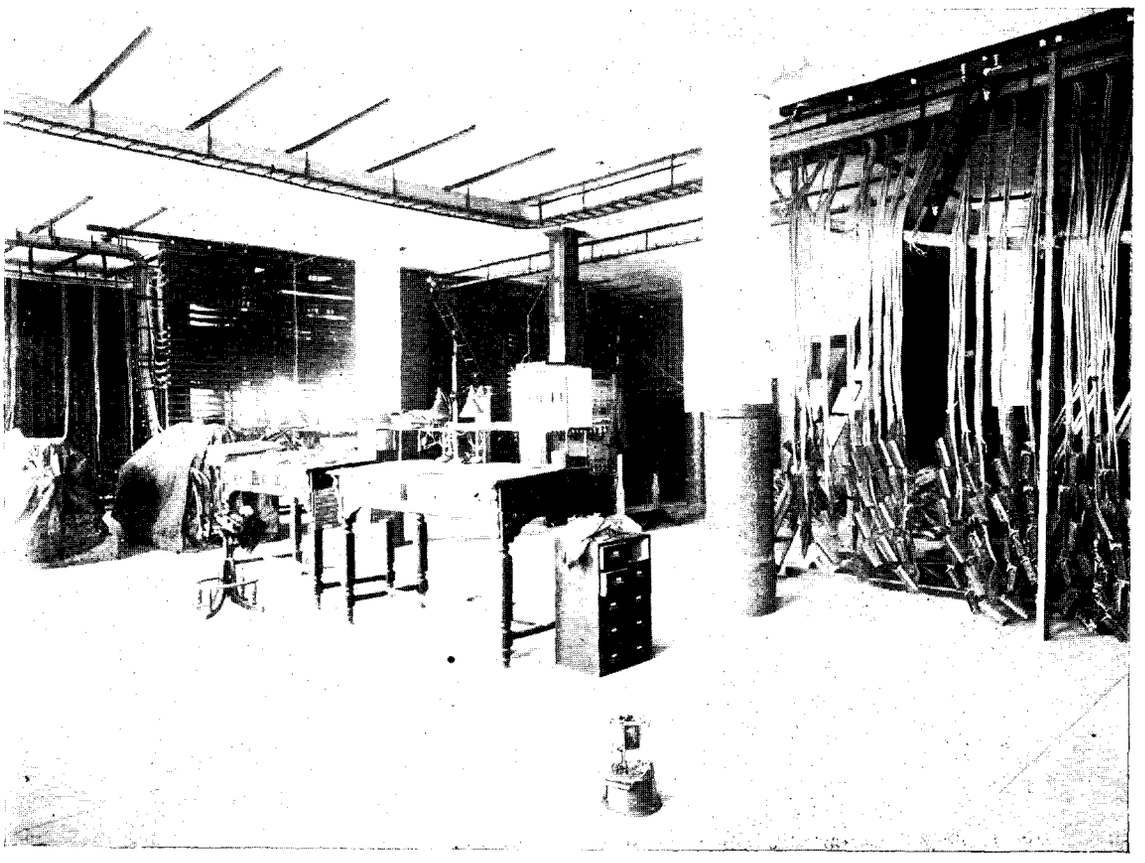
SOUTH EXCHANGE BUILDING.

Showing effects of Earthquake on West Wall and corner of Roof.



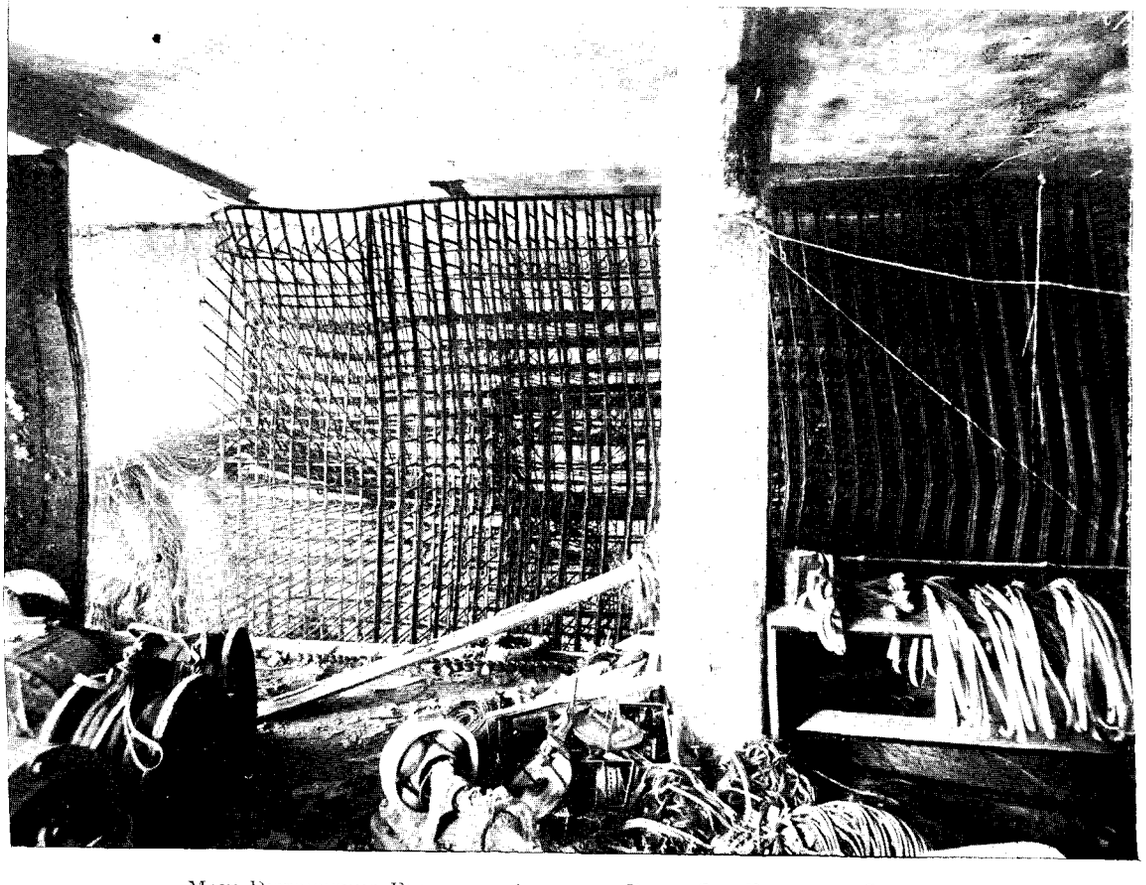
EAST EXCHANGE BUILDING.

Showing the splendid condition of this building. The City Hall is in the background, eight blocks from East Office.



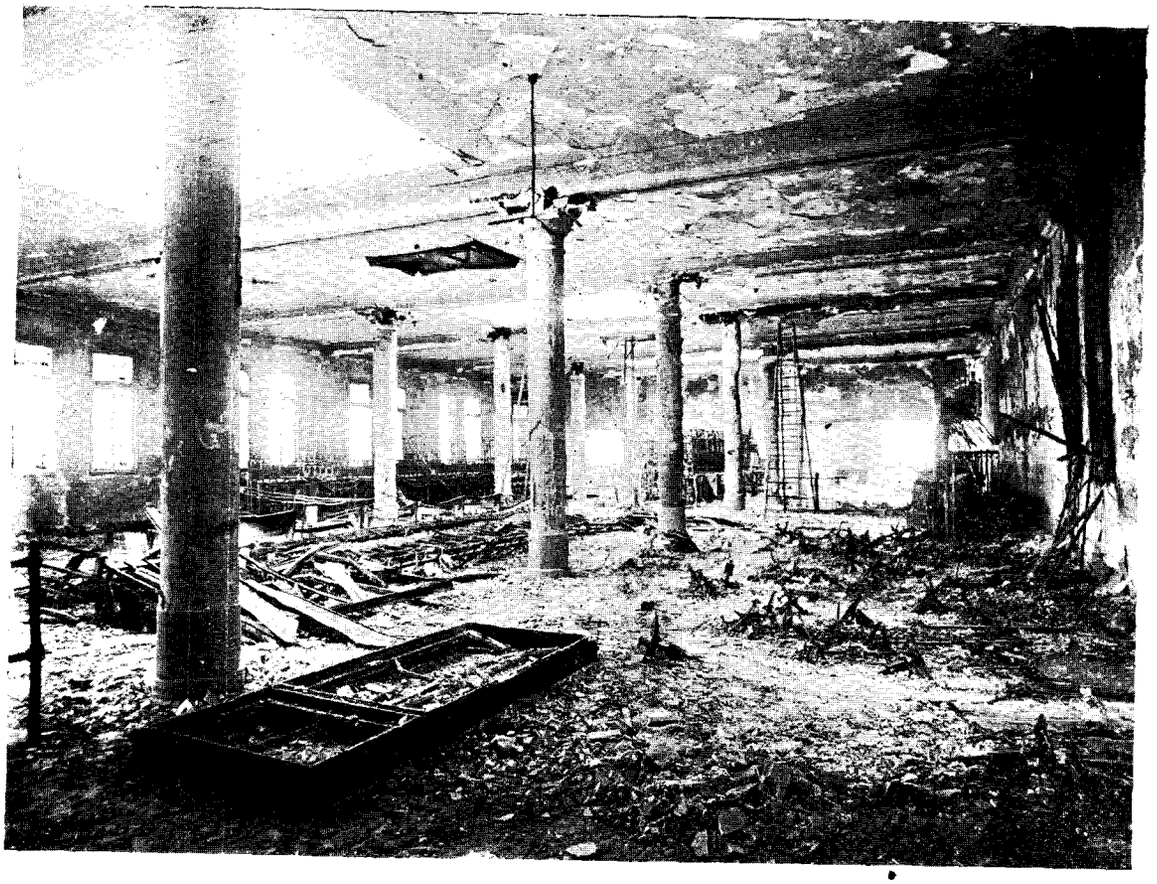
SECOND FLOOR OR APPARATUS ROOM OF SOUTH OFFICE, SAN FRANCISCO.

This Floor was used for Apparatus, Wire Chiefs, and Power Plant, and is to-day in perfect condition.



MAIN DISTRIBUTING FRAME AND APPARATUS ROOM, SAN FRANCISCO, CALIFORNIA.

This Frame was Equipped with 400 Hayes' Arresters per bar. The Dynamo in the foreground had not been unpacked up to April 18, 1906.



THIRD FLOOR OR OPERATING ROOM OF SOUTH EXCHANGE, SAN FRANCISCO

This Equipment was to be cut into service April 22, 1906, and consisted of 60 A Operators' Positions, 42 B Operators' Positions, and Desk Equipment.

VIEW OF DOWN TOWN, SAN FRANCISCO, TAKEN FROM THE HILL NEAR THE LATE MRS. JANE STANFORD'S RESIDENCE.

The Building marked **X** was and is San Francisco Main Exchange Building. The Building marked **X X** is the San Francisco Call Building—also known as the Claus Sprechel's Building. The Palace Hotel is one block to the east of this.

THE
National Telephone Journal

VOL. I. JULY, 1906. No. 4.

TELEPHONE MEN.

II.—GEORGE FRANKLIN.

ALDERMAN GEORGE FRANKLIN, J.P., the new President of the National Telephone Company, is a typical British captain of industry, one of those who, to the credit and profit of English public life, do not confine their energies and interest solely to the development and efficiency of the industries they are allied with, but give a generous portion of their time and efforts to the development and efficiency of the nation. Mr. FRANKLIN, although a man of many and absorbing occupations, is a leader of thought and activity in the public life of Sheffield, the centre of one of the world's greatest industries. He was for ten years a Councillor, representing St. Phillip's Ward, and in 1891 was elected Alderman. In 1897-8 he was Lord Mayor of Sheffield, following the Duke of NORFOLK, and in connection with the visit of the late QUEEN VICTORIA to Sheffield, in 1897, he received a decoration at the hands of the Sovereign.

Mr. FRANKLIN is Pro-Chancellor of the newly-founded University of Sheffield; in the promotion and founding of this great institution he took a leading part and did a vast amount of valuable work. He is Vice-Chairman of the Sheffield Education Committee, and has been one of the moving spirits in all the various schemes for improving the elementary, secondary, and higher education in Sheffield. He is Chairman of the Markets Committee, and in 1899 negotiated the purchase by the Corporation from the Duke of NORFOLK of the Sheffield Markets at a price of £530,000. He also negotiated the purchase by the Corporation of the electric light undertaking started in Sheffield by a private company. Mr. FRANKLIN is a Justice of the Peace for the City and the West Riding, a Town Trustee, a City Overseer, Treasurer of the University College Building Fund, leader of the Conservative Party in Sheffield, and one of the founders of the new Sheffield Conservative Club, besides being a member of the governing bodies of most of the philanthropic and other public institutions in Sheffield.

With so much public work on his hands it may cause wonder that Mr. FRANKLIN has time for any private affairs, or for the prosaic and selfish work of making his own living. But it is ever the case that those who do the most are best able to find time to do other things. The telephone business loves active men, and active men take kindly to the telephone business. Mr. FRANKLIN has been connected with electrical affairs since the early days of electric lighting, and his interest was naturally aroused in the telephone, at a time when it required some discernment to appreciate the commercial possibilities of telephony. He became a Director of the old Sheffield Telephone Company, and when that Company was amalgamated with the National, in 1892, he joined the Board of the National Telephone Company. In 1902, he was elected Vice-President, and on the recent resignation of Sir Henry Fowler, he became President of the Company.

Mr. FRANKLIN, who spends about half his time in London, has always taken a keen interest in the finance of the Company we had almost forgotten to mention that his profession is that of a chartered accountant, and that he is an authority on finance—and in the technical education and general advancement of the staff. Mr. FRANKLIN would perhaps not read at sight a common battery diagram or give an expert opinion on standards of transmission, but on the broad questions of organisation, efficient work and efficiency of service, of the duties of the staff to the Company and of the Company to the public, he has clear ideas and high ideals. The Glasgow staff will remember a speech he made them about four years ago, when the Corporation of the Second City were gaily spending their hundreds of thousands in building a competing telephone system. The competition at that time looked rather ominous, because if you care to squander a quarter of a million of public money in providing a service at under cost price you can get plenty of customers, and can put the commercial concern, bound to business methods, at a serious

disadvantage. Mr. FRANKLIN, in his cheery, hearty way, pointed out to the Glasgow National staff that the competition must be one, not of spiteful warfare, but of efficiency, and that the more efficient service would survive. His advice was helpful and his prophecy has come true, more quickly than most prophecies do. The efficient National service in Glasgow has for a long time past attracted the majority of telephone users, and the National system has so far outdistanced the Corporation system in size and scope that the latter has become almost a negligible factor in the situation.

Mr. FRANKLIN was born in 1853 at Edinburgh, but he has lived in Sheffield, greatly, as the above sketch shows, to Sheffield's advantage, since 1858. He is head of the firms of chartered accountants of George Franklin & Company, of Sheffield, and Franklin, Wild & Company, London. He is also Chairman of the Sheffield & Hallamshire Bank. Whether Mr. FRANKLIN has any favourite recreations beyond shooting and motoring we are doubtful: perhaps he follows Mr. CHAMBERLAIN'S plan of taking but little exercise and living entirely for work. It seems to agree with him, as he has a fine presence, a hale and hearty air, and the cheerful smile and cordial handclasp that betoken a sound constitution.

MOVING A SWITCHBOARD AT PAISLEY.

BY R. AUDSLEY, *Local Manager*.

WE are at present laying ducts and pipes in preparation for the transfer of our overhead open wire system to an underground system. We are also replacing the existing testboard by a 2,000-line testboard and adding a new 180-line party line section.

As our testroom was too small to accommodate the new frame, we had to take down a partition between the testroom and the switchroom, and rebuild it three feet further into the switchroom, but before this could be done we had to remove the existing switchboard three feet. This was no easy matter, as the board is made up of three sections, each with three operators' positions, and to move it and keep the subscribers working required some little management. It was done, however, without a single hitch or one subscriber being disconnected.

The method adopted was as follows:—

In the first place all the bolts which kept the board rigid were taken out, and as we had plenty of spare cable we were sure of getting the board the required distance if we could get suitable rollers to place the board on. There are two large threadmills in the town, and I approached Messrs. CLARK & Co., Ltd., of the Anchor Thread Mills, and asked them if they would kindly oblige me with a few lengths of the rounded birch wood which they use for making reels, and they very kindly gave me 24 pieces, each about 3 feet long and 1½ inches in diameter. By the use of these the boards had only to be raised sufficiently to allow of the rollers being placed underneath.

As switchboards are heavy and cumbersome articles to deal with, I got a squad of wiremen up at 6 a.m. one morning, and they managed to get the rollers in and the boards into such a position that I was able to get them rebolted and made rigid before moving them. The next morning I had the same squad up at the same time, and we got the boards moved into the new position, after which they were unbolted and each section taken off the rollers separately. They were then all levelled with a spirit level and rebolted.

FIRE DRILL AT HOLBORN EXCHANGE.

AN alarm was given at 12.23 p.m. on May 3. Immediately the alarm was given the male staff assembled at the seat of the supposed fire (in testroom), bringing with them the following extinguishing apparatus:—

12 buckets of sand,
4 chemical extinguishers,
4 asbestos blankets,

and ran out the hydrant hose in 70 seconds. Meanwhile, the operators, numbering 58, were marshalled out of the switchroom, which was cleared in 90 seconds. This is a very creditable performance.

Subsequently, ten operators, selected from the various teams, were present at a demonstration of the use of chemical extinguishers and assisted in discharging them.

DO SUBSCRIBERS APPRECIATE A CHEERFUL VOICE?

BY MARION BAILEY, *Avenue Exchange*.

THERE can be little doubt that the cultivation of a cheerful voice is one of the most important points to be considered in all the relationships of life, whether public or private, domestic or otherwise.

There are some who are gifted by nature with pleasant voices, and to whom it is no difficulty to speak cheerfully, but all are not so greatly favoured; yet our voices may be trained to such an extent that by careful practice cheerful speaking will become habitual.

Subscribers are too apt to become irritable and impatient at any hitch in the good service they consider should always be theirs (heedless of the fact that even the wheels of a telephone exchange cannot always run smoothly), and a reply given in a voice which to their critical ears sounds harsh and dull will often tend to irritate them still further, and call forth denunciations against the hapless operator—to whom very probably no blame attaches.

On the other hand, a sprightly, cheerful voice, giving a lucid explanation of any trouble that arises, will have in many cases quite the opposite effect, and will make the subscriber feel satisfied that his calls are in efficient hands and will be attended to as promptly and carefully as possible.

It is to be feared, nevertheless, that there are subscribers who do not appreciate the merits of a pleasant voice, however evident these may be, and who are unmoved by the most charming and seductive voice that ever sought to gain an answer to the oft-repeated question, "Number please." Whether it be the croak of a frog, or the trill of a nightingale, the drone of a bagpipe, or the music of a lute—all is one to them.

Practical and prosaic they are like the man of whom it was said—

"A primrose by the river's brim
A yellow primrose was to him
And it was nothing more."

What they want is prompt attention and plenty of it, with neither let nor hindrance, error nor delay. Give them this, and never mind about the quality of the voice, whether it be cheerful or sad, mirthful or morose, provided only that the voice is there. It always has been, and ever will be, impossible to entirely please these unseen terrors of the telephone, who receive far more courtesy and consideration from the operators than many whose invariable good humour and pleasantness should be fully and freely reciprocated, and who do undoubtedly appreciate a cheerful and cordial voice at the exchange end.

Mannerisms of voice and speech should be carefully avoided. Among the many who come and go may be noticed various peculiarities of voice; there are those who adopt a certain sing song intonation, far from pleasant to listen to either by subscribers or other operators working near Then again there is the voice which sounds peevish and discontented, as if the owner found life hardly worth living, if one may judge by the way in which she invariably speaks.

Sometimes a subscriber is unreasonable in his demands, and impatient because his request for an undue share of attention is not complied with. If in such a case the operator, instead of replying in the same strain, were to adopt a gentle tone, all might be well, and much irritation and unpleasantness might frequently be avoided.

It would perhaps be an advantage to operators if they could hear themselves as others hear them, but as this can hardly be, they must submit to the voice of criticism with the best grace possible and endeavour to meet all demands with unfailing courtesy and cheerfulness. It should ever be remembered that the tone of voice in which words are spoken is sometimes more expressive than the words themselves, and that a pleasant voice goes far towards winning esteem and popularity for its possessor, whether as a telephone operator or in any other capacity.

THE TELEPHONE AND THE EARTHQUAKE AT SAN FRANCISCO.

A DESCRIPTION OF THE DAMAGE SUFFERED BY THE PACIFIC STATES TELEPHONE COMPANY.

THROUGH the courtesy of the Michigan State Telephone Company we have been supplied with the following article by Mr. J. J. FOLEY, Chief Installer, for the Western Electric Company in California, to both of whom we tender our sincere thanks. The illustrations are in the special Supplement.

The earthquake occurred on April 18, 1906, at 14 minutes and 48 seconds past 5 a.m. The first and great shock lasted for 47 seconds. The succeeding fire burned for 72 consecutive hours and covered an area of 4·11 square miles or 2,631 acres. Five hundred and fourteen city blocks were completely burned. The fire line at the widest point was 10½ miles long. Three hundred and eighty-nine lives were lost and the loss to property was $375,000,000. The combined loss in the three great conflagrations of Chicago, Boston and Baltimore equalled only one-half of the area destroyed by the San Francisco fire.

The above figures are official and absolutely accurate.

Wednesday, April 18, 1906, as a day of mourning for San Francisco has passed into history, and to-day the city is a hustling, ambitious and more than progressive city of what we consider another era.

The new main office equipment of the Pacific States Telephone Company of San Francisco was the most complete in the United States, and that, of course, means that it was without an equal in the world, first for its size and second for its completeness.

The eight-story building shown (picture of which accompanies this article) was and is still the main office. The entire building was devoted to the equipment for San Francisco down-town telephone users. The fifth, seventh and eighth floors were utilised for three distinct and complete exchange units. That is, exchange No. 1 on the eighth floor consisted of 42 "A" positions, 22 "B" positions, and ten desk operators' positions. Exchange No. 2, on the seventh floor was similarly equipped, and exchange No. 3 on the fifth floor had twelve "A" positions, eight "B" positions, and four desk operators' positions.

The operators' school occupied the fourth floor, and the long distance equipment was on the third floor and consisted of 50 line positions, fourteen recording positions, and twelve telegraph positions, besides a very complete desk and supervisor's equipment.

The first floor had the wire chief's desk, toll testboards, power plant and main distributing frame.

The second and sixth floor were devoted to operators' quarters.

As the picture referred to clearly shows the building was absolutely uninjured by the earthquake. The writer made an examination of the apparatus on that awful morning at 8.15 a.m., and the apparatus, which was about 60 per cent. installed, was uninjured in any way. The building was brick and steel construction, built on the most modern and substantial lines. It was fireproofed throughout with reinforced concrete, and was equipped with inside fire shutters and Kinnear steel rolling fire doors, but when the fire reached this district about 11 p.m. on the night of April 18, the heat was so intense that no device of man could save the building. The writer made an examination of the interior of the building at 12 a.m. on April 19; all the contents were a mass of glowing embers, indicating clearly that the fire shutters had performed their part admirably, and that the combustion of the equipment was rather a cremation than a blazing fire. The equipment was totally destroyed. The upper part of the building shows where the contractor is removing those sections of the concrete flooring which indicate any weakness at all.

There is a complete new exchange at this date, May 20, in working order on the lower floor, installed since the earthquake, and the telephone public are getting service as fast as their applications are received.

In the illustration showing a general view of San Francisco after the fire, the "X" on the second picture denotes the San Francisco main office building, and the other buildings form what were Third and Kearney districts, the retail centre of San Francisco.

The next picture is the East Office Exchange building. This was constructed on the same substantial lines as the main office and was a brick and steel building with reinforced concrete, thoroughly fireproof and equipped with fire shutters. It will be noted that is the only building standing for a radius of at least one-half mile. The equipment in this exchange consisted of 36 "A," sixteen "B" and desk operators' positions. On the third floor were the apparatus rooms, while the girls' quarters occupied the second floor. The first floor consisted of the manager's office, clerical office, battery room and pothead racks. The picture shows clearly that the building was uninjured by the earthquake. This exchange was in the hotel and apartment house district, and, of course, the fire raged here fiercely and prevented any possibility of saving this plant. This equipment was cut into service April 15, 1905.

The next picture is the South Exchange building. The picture indicates the damage done by the earthquake. The building is the same as the Main and East Exchange buildings as regards class and construction, but it was in what is known as the Mission district. This district, according to the early historians, was formerly a marsh and filled land. This filled land is the only place where the earthquake did any damage. Part of the roof of this building was shaken down by the earthquake, and unfortunately a storage shed was adjoining this section of the building. The fire spread from this storage shed to the roof of the telephone building and completely destroyed the equipment on the third floor, as shown in the fifth picture, but did not spread to the second floor or apparatus room, shown in the sixth picture.

The majority of the homes in this vicinity were old frame buildings of one or two storeys, and undoubtedly the South office would be intact at this time if the earthquake had not shaken down a section of the roof.

The West Exchange building was not injured by either the earthquake or the fire. This building was of the same construction as the others, and consisted of 36 "A," sixteen "B" and desk positions. The equipment was cut into service July 4, 1905. This exchange was on April 18 the scene of great activity. All long distance lines formerly terminating at main office were immediately connected to this exchange. In addition to this the United States Government Signal Corps were given free access to all telephone lines and equipment that could in any way facilitate the relief work. Such subscribers as desired telephone service in any part of the town were connected through the underground cable system to this exchange until the former exchanges were reconstructed.

The work of reconstruction is being pushed at a tremendous rate, and the public in San Francisco will have the most improved telephone service to lessen their labours in rebuilding the city.

THE TELEPHONE IN EMERGENCY.

NUMEROUS cuttings from the Press of cases where the telephone was useful in emergency continue to reach us.

The *Glasgow News* of June 4 says that the advantages of the telephone in the small hours of the morning were amply demonstrated in a case at Paisley, where the police were rung up at 2.50 a.m. on Sunday morning and informed that an attempt had been made by a burglar to break into a villa at Blackhall. The result was that the burglar was neatly captured.

In the same paper another case was mentioned where a girl was detected shop-lifting, and without arousing her suspicions the shopwoman managed to detain the thief while the police were telephoned for.

In the *Bournemouth Echo* appears an account of a daring burglary which was effected at Christchurch Workhouse, the telephone being used to put the police on the wrongdoers' track.

An extract from the *Liverpool Echo* says that on the explosion of the "Haverford" in the No. 2 Huskisson Dock, Liverpool, the following police vehicles were on the scene within ten minutes of a call from the National Telephone Company's call box:—Two single-horse patrol wagons, one double-horse patrol wagon, one children's 'bus, two steam fire engines, and one chemical engine.

The ambulance and waggon conveyed 32 injured persons to the Northern and Stanley Hospital.

THE COMPANY'S CORRESPONDENCE CLASSES, 1905-6.

ON June 22 the Engineer-in-Chief issued a circular, which, as it contains a report on the working and results of the past Session of the classes, we think will be of interest to many of our readers, and therefore publish it below, excluding only reference to the certificates, schedules of marks, etc., which were issued with the circular.

CORRESPONDENCE CLASSES, 1905-6.

General Results of Session.—The Session 1905-6, which is now concluded, has been of a distinctly encouraging nature, the number of members of the classes has gone up and the interest generally has been more maintained. The following matter discusses points in connection with the classes with the idea of letting District Managers know generally the way in which the classes are turning out, and I should like to take this opportunity of thanking District Managers and those who have responded to the request I made some time ago, that they should endeavour to cultivate the interest of the staff in these classes.

Comparison with previous Session.—As will probably be noticed from Schedule A, there has been this Session a large increase in the number of men who have gained 60 per cent. and upwards of the total possible marks compared with the previous Session. The percentage of members gaining 60 per cent. and upwards of the total marks has, as regards the classes as a whole, also increased, as shown in the following table, although it will be noticed that in the case of the Mathematics and "B" Courses there has been a falling off:—

a.	*b.*	*c.*	*d.*	*e.*	*f.*				
Session.	Total members.*	Active members	Number of members answering	Per cent. of *d* on *c*.	Percentage of members gaining 60 per cent. and upwards of possible marks.				
					In various courses.				In all courses.
					A.	M.	B.	C.	
1904-5	1,450	1,321	655	49	33·8	37·8	31·7	..	34·2
1905-6	2,378	2,169	1,199	55	35·3	26·6	27·4	65·4	36·2

* This including those who took the books only.

Unsatisfactory Points.—The decrease in these two cases is not satisfactory, and there are two points that call for special mention, viz., the way men take up a course in the classes and then drop out altogether, and the way they discontinue sending in answer papers after the first one or two.

Members dropping Classes.—Regarding the first point, in order to illustrate what I mean, ten representative districts were taken and an analysis gave the following result: Number of members "A" Course, 1904-5, 172. These were accounted for in the next Session, 1905-6, thus:

57·0 per cent. dropped classes altogether.
18·6 ,, joined "B" Course.
10·4 ,, ,, other Courses.
14·0 ,, rejoined "A" Course.

100·0 per cent.

Analysing the 57 per cent. or 98 men who dropped out, the record of their answer papers sent in during the Session 1904-5 is:

Answers to Papers.
75·5 per cent., none.
19·4 ,, half or less.
5·1 ,, more than half.

100·0 per cent.

Number of members "B" Course, 1904-5, 151. These were accounted for in the next Session 1905-6, thus:

27·1 per cent. dropped classes altogether.
49·7 ,, joined "C" Course.
14·6 ,, joined other Courses.
8·6 ,, rejoined "B" Course.

100·0 per cent.

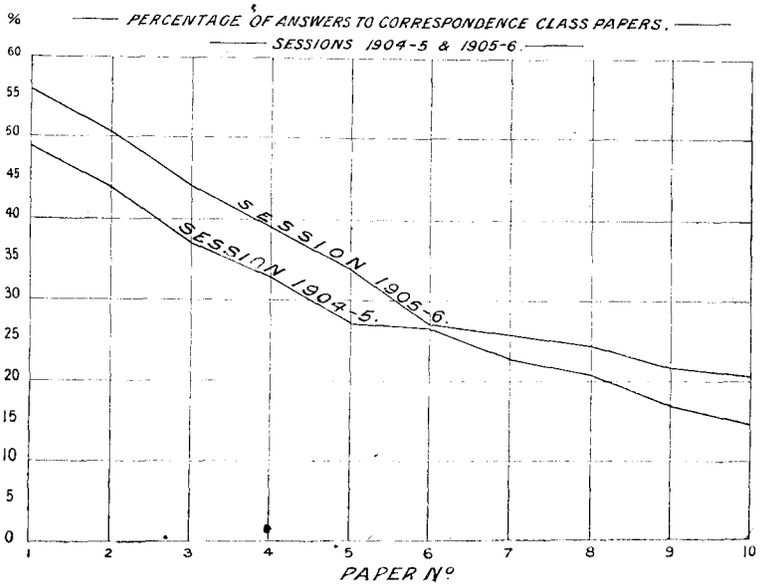
Analysing the 27 per cent. or 41 men who dropped out, the record of their answer papers sent in during the Session 1904-5 is:

Answers to Papers.
73·9 per cent., none.
21·7 ,, half or less.
4·4 ,, more than half.

100·0 per cent.

These results are believed to properly represent the average state of affairs. The Company makes a considerable grant towards the upkeep of the classes as it attaches great importance to them as an educational means, but members of the staff are not doing themselves justice if the classes are taken up and dropped promiscuously. The endeavour should be to get a man to qualify in the first year's course. If he has not done this, he should be encouraged to try again. Then when he has qualified, he should enter for the second and so on. I would like District Managers to extend, if possible, the interest they have taken in the local conduct of the classes by giving attention to this particular point, and encouraging men not only to join the classes but to take the instruction in its due sequence, and having started to continue throughout the course. This should reduce the percentage of members dropping out very materially. As the matter stands at present there is a waste of the advantages provided by the Company and the men are not benefitting.

Falling Off in Answering Questions.—As regards the second point, *i.e.*, as to the drop in the number of answer papers sent in; this generally is another indication of the proper amount of interest not being maintained in the class work, and District Managers would do well, if possible, to supervise this matter also. The falling off alluded to is shown graphically by the accompanying curve, the Session 1905-6 being compared with that of 1904-5. This represents the percentage of answer papers sent in for all the courses throughout the Session on the total possible number, the number of such members who wanted the books only being of course excluded from the calculations. At the commence-



ment of the Session 1905-6 when the curve is at its highest, only a little more than half the number of answer papers which should have received were sent in and thereafter the curve maintains a steady down grade until at the end of the Session less than a quarter of the total number possible were received. I drew attention to this matter in connection with Session 1904-5 in my circular letter No. 342 of August 14 last, and since that date an improvement has taken place as shown by the relative position of the two curves, but it is quite evident that a much larger percentage of the members should answer the questions, and that there should not be such a decline in the rate of answering as there is.

Operators joining Classes.—A point which might be worth mentioning is that during the Session just ended a number of operators in London joined the classes and did good work, several obtaining certificates.

District with Best Results.—The Hanley district occupies an unique position, all the members of the classes in that district obtaining certificates, the marks obtained by any one man ranging from a minimum of 72 per cent. to the full 100 per cent.

Next Session.—The Session 1906-7 of the classes is due to start about the end of September next.

"THE MAN FROM MISSOURI."—A POINTER FOR CANVASSERS.

TELEPHONE usage has become so pervasive nowadays that it is not possible to think of any individual or of any class of society that does not need the telephone. They may be so short-sighted as not to see this, but in considering the community as a whole, 99 out of every 100 people unquestionably would be better off with a telephone in the house.

The prospects interviewed during a day's work may be divided into two classes then—those who know they want the service and are waiting for someone to come along and take the contract, and those who do not know this, but must be convinced of their need. For the first class, all that is necessary is a man who can write enough to fill in a contract, and show the subscriber where to put his name. He can be called a solicitor only when he is able to sell an intercommunicating system or a direct line to a man who thought he wanted a party line. The second class, the man who says, "Show me, and I will buy," is the prospect who is going to put you to your best. He is not a crank just because he wants to know all about it first. He is not behind the times because your arguments fail to convince. He is simply the "man from Missouri" who has to be *shown*.

Now, the solicitor who is willing to simply reap the ripe harvest, and thinks that sowing the seed is a waste of time, will soon find that the net results of his canvass are less and less each day. The only way out of this situation is to have your arguments in better shape. When a prospect begins to make objections and to ask questions, don't offer him vague generalities about "everybody uses it, so it must be good." Have an experience with some other subscriber or an illustration to cover the point always at hand. When an objection is made that you cannot meet, study out an answer to it or consult the district manager. In a word, be ready for a man who is willing to object to putting in the service, for he is the one who will educate you to be a better telephone man and fit you for higher things.—*The Telephone News*, Philadelphia.

A CONTRACT EXPENSE CURVE.

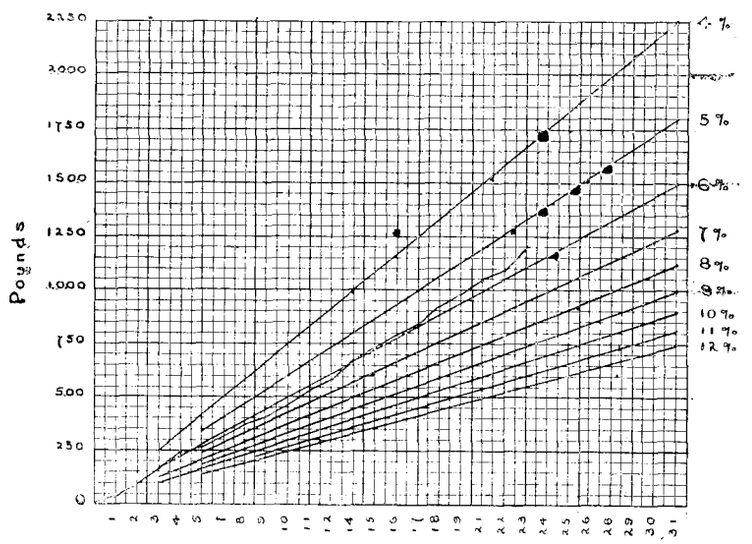
By W. Haimes, *Nottingham.*

The following method of keeping easily in touch with the daily results of the work of a Contract Department and observing continuously the ratio of expense to new revenue obtained will be found useful.

Estimate at the beginning of the month the probable expenditure in wages, expenses, rent, postage, etc., and taking the total, calculate from this figure what revenue must be obtained to give percentages of expense to revenue from 4 to 12. As an example, let it be assumed that the total expenses of a Contract Department amount to £90 for a 27-day month (Sundays omitted); then,

Ratio of Expense.	Revenue to be obtained for a month.
4 per cent.	£2,250
5 ,,	£1,800
6 ,,	£1,500
7 ,,	£1,286
8 ,,	£1,125
9 ,,	£1,000
10 ,,	£900
11 ,,	£818
12 ,,	£750

Prepare a curve sheet with these amounts of revenue as ordinates, as shown in the diagram.



May, 1906.

Each day plot on the diagram the total amount of revenue obtained from beginning of month to date.

From this curve the contract agent at a glance can tell the total revenue obtained to date, and the total likely to be obtained by the end of the month at the same rate, together with the percentage of cost.

From the diagram it will be seen that up to the 23rd of the month £1,200 of revenue had been obtained at a cost of 7½ per cent., and that if the same rate were maintained to the month end the revenue would then stand at £1,625 and the percentage of cost at 5½.

A PENNYWORTH.

What the humble "copper" will do by telephone was well illustrated in Sussex quite recently. A motorist was stranded in Bognor on his homeward journey, about 12.45 a.m. He obtained access to a telephone, and by the usual means and payment of a penny he obtained attention from the exchange attendants. These good people hastily arose and on receiving the call, which was for Littlehampton, rang up the Chichester Exchange, the attendant of which, in turn turned out and rang the Littlehampton Exchange. When the final connection was made, the message was to this effect: "Will you kindly run across the road and tell my wife the motor has given out and that I am cycling home." The subscriber blessed his telephone and good naturedly complied with the request.

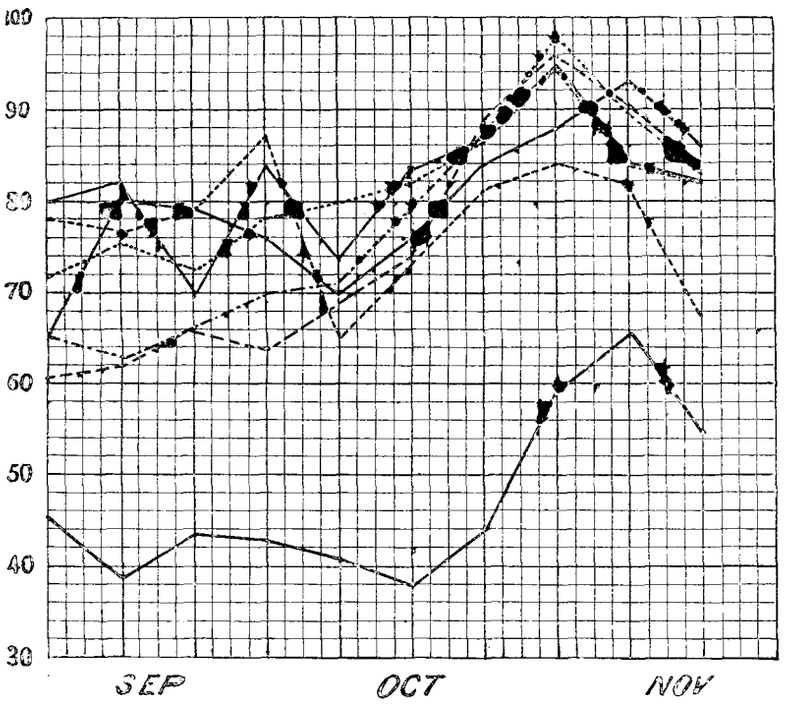
INSTRUMENT DEPARTMENT SUPERVISION.*

By A. Wright, *London.*

The subject matter of this paper is intended to relate to the Instrument Department of a large exchange where two or more fault clerks are employed, though generally speaking the information can be applied to any Instrument Department; and I have particularly considered this point with a view to making the paper of more general interest; my endeavour has been to present as much information relative to the control of the Instrument Department as is possible within reasonable space.

The work of the Instrument Department is recorded by one or more fault clerks, and the result of that work is closely supervised by the Chief Inspector. The fault clerk's position is one of considerable importance; in his hands rests much of the responsibility for getting faults cleared rapidly and effectively, which is the means of saving our subscribers much dissatisfaction and annoyance, and, incidentally, much anxiety to ourselves. Therefore, if the fault clerk's work is arranged on a sound basis, and he is taught to place the necessary faith in the various returns that are periodically got out, much can be done to lessen the duration of faults and the number of complaints.

FIG 1.



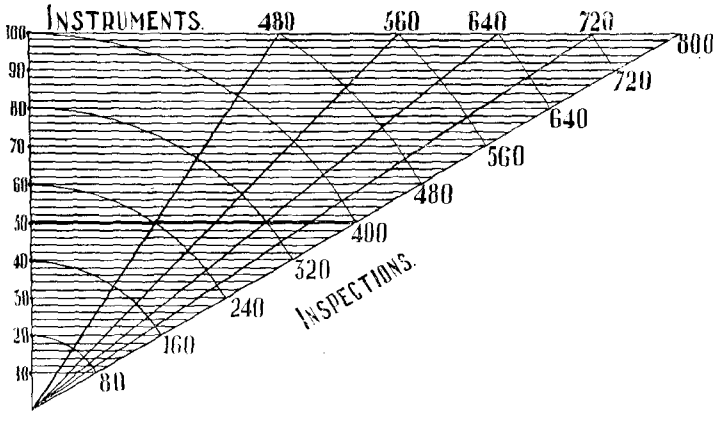
The control of this department lends itself to the exercise of ingenuity in devising means of checking and comparing day by day and week by week the work of the inspector, and examples of this will be apparent as the records are described. The arrangement of the inspectors' duties varies in different centres; in some cases the one inspector deals both with faults and inspections, and in others the work is divided between two men, one doing faults and the other inspections. There is much to be said for both of these methods, but I think it is now generally agreed that the latter, *i.e.*, the divided, duty is the better, especially where there are more than two inspectors. It is found, however, that by keeping the inspectors in pairs—one for faults, and one for inspections in the same area—greater ease in supervision is gained, and the inspectors appreciate the responsibility of keeping their districts well up to the mark. A graphic record of the number of faults in each district has been devised (Fig. 1), and, if the nature of the districts is

* Based on a paper read before the London Telephone Society, November, 1905.

comparable — *i.e.*, generally residential, or generally business premises—the record is found to be of much utility.

The ordinates represent the percentage of faults, and the abscissæ the dates. As the faults pass through the fault clerk's hands—whether reported by letter, docket, verbally, or by any other means—an account is kept of the number of instrument faults in each area. At the end of the week they are added, and a set of curves plotted, using different coloured ink for each area; and as these curves are accessible to the inspectors, they are in a position to know how each is maintaining his district. That the faults are a sure index of the state of the maintenance is a well-known fact, and is duly appreciated by the inspectors concerned.

FIG. 2.



In connection with these graphic records, I would like to mention one, shown in Fig. 2, devised by Mr. BLIGHT, which is very ingenious. By its use one can see at a glance the percentage of inspections done at any date, and for any number of instruments. With the ordinary curve (Fig. 3) it is necessary to know the percentage done, and this is plotted weekly and compared with the theoretical curve, or the number that should have been done up to that date; but with Mr. BLIGHT'S curve there is no need to work out the percentages, as they can be read directly. In the illustration this chart is made out in skeleton, so to speak, so that the main features can be seen more clearly. A working chart would, of course, contain much more detail. The figures on the top line indicate the number of instruments that each inspector has allocated to him, and the oblique line represents the number of inspections done. The number completed each week is marked by a pin with a coloured head, so that the work done by each inspector can be seen at a glance. For instance, we will assume an inspector has 640 instruments to maintain: When he has inspected, say, 160 of these, a pin will stand at 160 on the diagonal line; then, if the arc is followed to the point where it intersects the 640-instrument line, and then the horizontal line is traced to the scale on the left, it will be seen that 25 per cent. have been done. Similarly—

80 inspections = 12·5 per cent.
320 ,, = 50·0 ,,
480 ,, = 75 0 ,, and so on.

It is most essential that the Chief Inspector and the fault clerk should know the working capacity of the inspectors as represented by the number of inspections that can be made, though it must be borne in mind that no definite rule can be laid down, as the conditions in different districts vary so widely; but from various records that have been taken it appears that about sixteen per eight-hour day is a fair average on a magneto exchange. If the work is done properly, the instrument cleaned and lubricated, the speaking and ringing tried, and cords carefully tested, window blocks inspected, batteries tested, card signed, etc., half an hour per instrument is not an excessive allowance; but, as before mentioned, local conditions must be considered, and particularly the telephonic density of the area.

The following extracts from the instructions issued to the Chief Inspector indicates the methods of dealing with the inspections:—

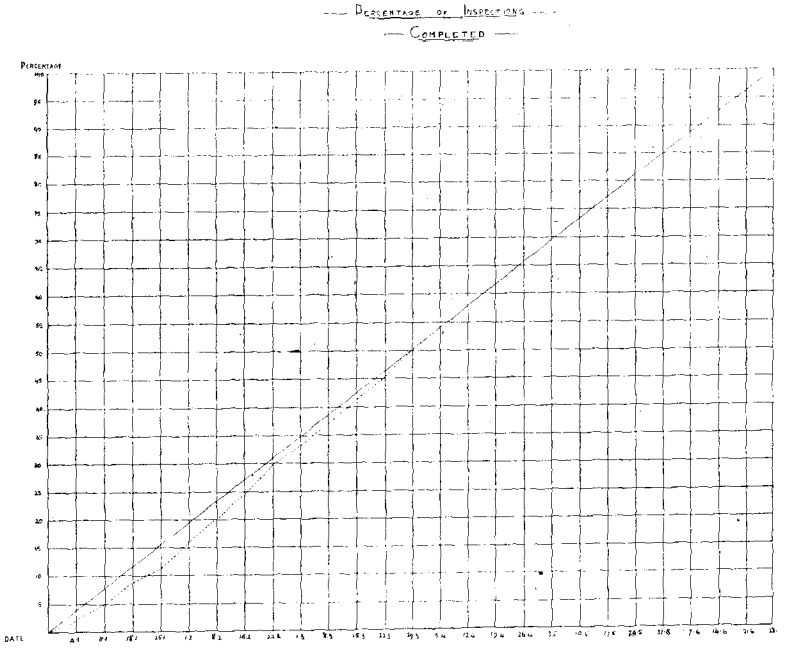
> "Each inspector is allocated a local district and is daily "given a list of subscribers to be visited. This is compiled "from a street card containing the name and address of every "subscriber alphabetically arranged; the street numbers "running consecutively minimises the amount of ground to "be covered and gives each inspector the maximum time in "which to carry out his work. In his journal the inspector "furnishes full details of each installation visited, and this is "checked with the fault cards daily, and any query taken up "by the fault clerk when transferring particulars of the "inspector's reports to the fault cards. When the inspector "has completed his list it is returned to the fault clerk and "again checked to ensure each installation being visited."

In most exchanges in the Metropolitan area a "Register Operator" has been established, *i.e.*, an operator who is deputed to be called up by the inspectors from each instrument they visit, and should the fault clerk want an inspector at any time he simply asks the "Register" to notify the inspector to that effect when next calling up.

Faults are given out to the faultfinder inspectors as they occur, and a fault clerk should have a thorough knowledge of the district to enable him to select the right man to give the fault to. This is important, as the difficulty is considerable when a dozen or more men are dealt with. By means of a fault card distributor, in which the cards are kept during the time the fault is on, the fault clerk can readily ascertain whether one man has more faults than he can manage, and if the fault duration is to be considered steps must be taken to relieve that man; this can be done by taking an *inspector* (as distinguished from a faultfinder inspector) off inspections and giving him some of the easiest faults to deal with. The inspector is quite accessible owing to his calls to the "Register," as just explained. It should be understood that the faultfinder inspector is senior in duty to the inspector.

In districts where there are a number of branch exchange boards it has been found a most successful plan to let one inspector who understands switchboards attend to them. This has been the means of saving much time and subsequent trouble, as the majority of instrument inspectors are somewhat unfamiliar with keyboards and are apt to put on new faults in their endeavours to clear others.

FIG 3.



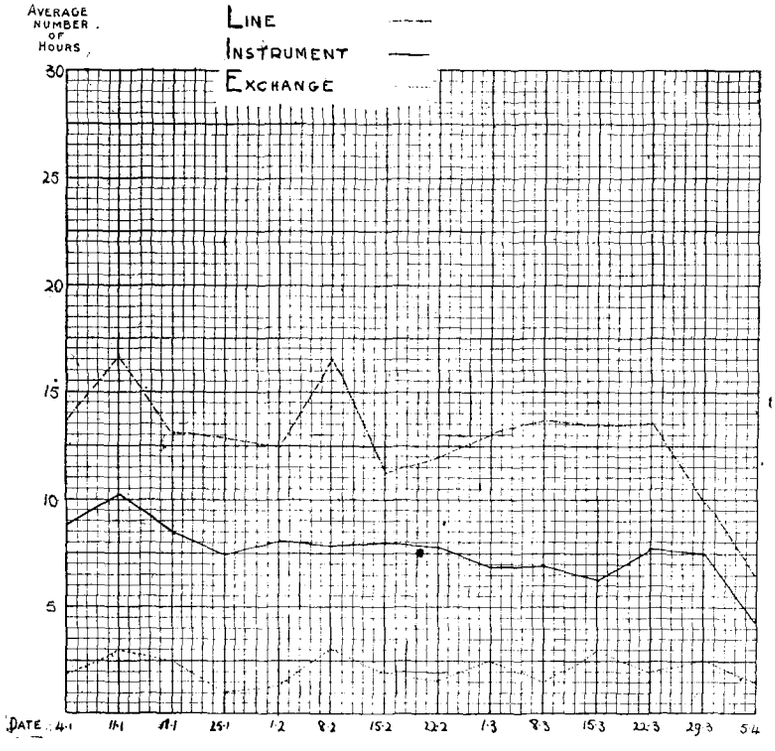
An important, perhaps the most important, detail of a fault clerk's work is to keep a watch on recurring faults. If, when entering a fault upon a card, it is seen that the line has been reported twice previously within one month, the Chief Inspector's attention is drawn to the fact, and he, in most cases personally, investigates the trouble, and takes such measures as will prevent its repetition.

The records kept by the fault clerk consist of daily analysis of line, instrument, and exchange faults; this serves to show whether an abnormal number of faults is due to some particular cause. The fault curve, on which is shown the number of line, instrument, exchange, and total faults for each day is of value, enabling the responsible person to see at a glance whether the faults are on the increase or the reverse, and if an area is over or under-staffed; a weekly return of inspections made; a weekly return of the increase in the number of exchange and private lines, stations, etc., and an average weekly duration return. Formerly this latter was only taken for one day a month, but it was thought that the instrument department staff might perhaps be tempted on that one day to

FIG 4.

— DURATION OF FAULTS CURVE —

— WESTERN DISTRICT —



devote all their attention to the clearing of faults, and to ignore the many incidental jobs that occur, and thus give a very favourable impression as to the duration; by making this return apply to every day of the week this temptation is removed and the duration given is representative. I have plotted a curve (Fig. 4) showing the average duration of the line, instrument and exchange faults for the western division (London), ten exchanges; the duration includes faults occurring on Saturdays, nights and Sundays; the exchange faults are of course lowest in duration, the instrument faults next and the line faults are the longest. This is accounted for by the fact that as a rule the instrument has to be visited before the line faultfinder really works on the fault, and the whole time is counted, *i.e.*, from the time the fault was first known to exist. This graphic record is of considerable assistance and gives much information as to the various causes of delay in clearing faults: thus armed, it is possible to prevent lengthy durations. A curve is kept for each exchange, otherwise it would of course be impossible, in the event of a high duration, to know which particular exchange was responsible. Examples of the curves are shown in Fig. 5.

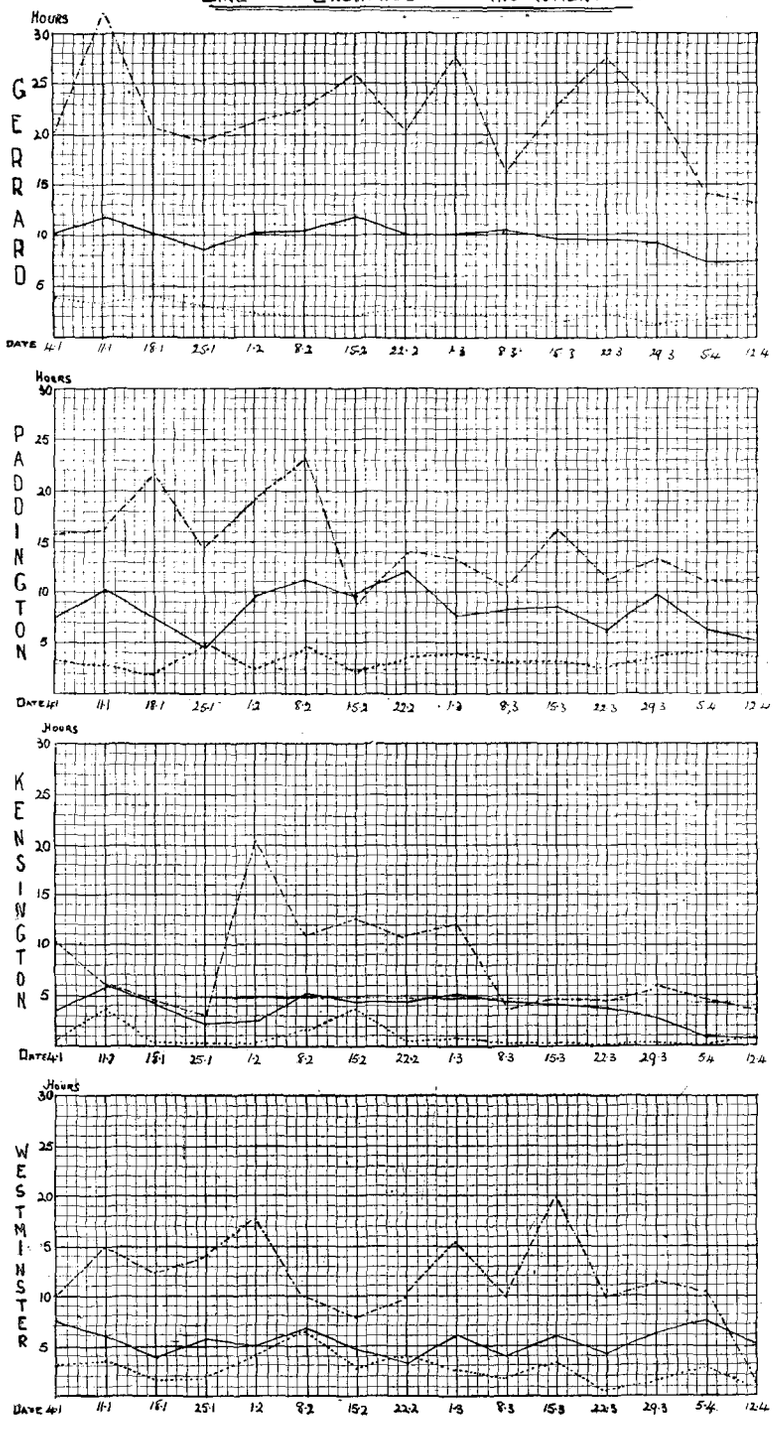
In addition to his other duties the fault clerk should make himself conversant with the whereabouts of the line gangs, and if a line which is near by or which passes the spot where the gang is at work is reported he can direct his line faultfinder to the spot where the fault will possibly be found, and so save much time.

When a man is chosen for the position of fault clerk, a question frequently raised is whether he should be a technical man or not. Having had experience of technical and non-technical, I unhesitatingly vote for the former, as it is essential, for one thing, that the fault clerk should be able to diagnose rapidly any "clear" given him by the inspectors, and not be misled by "clears" that do not fit the fault reported.

FIG. 5.

DURATION OF FAULTS CURVE.

LINE —— EXCHANGE ..... INSTRUMENT —



It will be gathered from the foregoing remarks that the position of fault clerk is no sinecure; if he is to be successful his undivided attention must be given to his work and he will find that in time he will become trained so to direct his efforts as to obtain a maximum of efficiency. Of course it will be understood that the whole of the duties carried out are carefully and systematically supervised by the Chief Inspector, and it is only by dint of keen observation on his part that the smooth working so necessary to this department is made possible.

EXCHANGE CATERING COMMITTEES AND THEIR WORK.

By MRS. B. M. PETERS, *Matron, Glasgow.*

THE article on "Exchange Catering Committees and Their Work," by the Examining Matron of the Metropolitan Traffic Department has, I feel sure, been read with much interest by the Glasgow operating staff, and will give them renewed interest in the dinners.

The remarks about Glasgow and the dinner tariff have brought this aspect of the matter again before me, and although in comparison with the Metropolitan area staff, the staff here is small and the methods therefore simpler, a few remarks on the subject may not be amiss. In Glasgow the arrangements are the same as in London, viz., the Company bear all the expenses except the cost of the food.

Dinners are only provided in one exchange, operators in other convenient exchanges dining there, and the average number catered for each day is 70. Up to the present time the dinners have been successful financially as well as otherwise, and it has been found that as the numbers dining increase, a better *menu* can be provided.

A small emergency fund has accumulated and has been deposited in one of the banks in the names of several of the operating staff. Any other small balance is disposed of at Christmas and other times in special dishes, the desire being not to make any regular profit, but to give the girls daily as good a *menu* as the charges will permit. So far things have worked smoothly, and there have been no serious complaints.

To make the dinners a success we find that four things at least are essential; a suitable committee, satisfactory contracts with butcher, baker, grocer, etc., a well-supervised larder, and last, but not least, *a good, economical, plain cook.*

As regards committees, these I think have their failings, and it is sometimes a case of "too many cooks spoiling the broth," all being responsible, yet not one in particular. Members may be elected who are quite unsuited for the position—every girl is not a good caterer, just as every girl will not make a good telephone operator; this may imply no reproach, but it would seem that naturally some are not adapted for the work. Members should not accept office unless they feel they are able to give satisfaction, and at no time must they shirk responsibility or work, but must at all times do their utmost to secure the best results. They should remember that they have been trusted financially as well as otherwise, and should endeavour to spend the money judiciously and to the best possible advantage, thus justifying the trust reposed in them and the distinction conferred on them.

Contracts with the various merchants are a most important matter; they should be made with good reliable firms on the best possible terms. I do not know whether all the committees in London benefit by the same terms of contract, but, if not, the *menus* and profits must necessarily vary to a certain degree. It should be possible in London, I think, to get very good terms, if the same contractors provide for all exchanges. A central committee might be formed of, say, two from each committee, and the members might meet at the beginning of each financial year, and arrange the contracts. At other meetings, held throughout the year, *menus* might be exchanged and experiences compared. This would be to some extent team-working between the catering committees, which the General Manager, in his message to the staff, commended in its broadest sense.

A well-supervised larder is most necessary to ensure that nothing be wasted. The tariff is so low that the smallest amount of waste must affect the finances. *Menus*, so far as our experience goes, should be arranged for one week, subject, of course, to small alterations, and in this way everything can be used and nothing thrown out.

Early dishes should be avoided, as they are expensive, upset the operators, and often cause illness.

All the above matters may be satisfactorily arranged, but if the cook is extravagant she will upset the best calculations, and it is therefore most necessary to secure one who is economical and who can carve well. In order that she may be able to give her undivided attention to the cooking, it is advisable to give her the requisite number of kitchen maids, who must be strong, willing, and able to get through a fair amount of work.

As regards price, this to a great extent must be regulated by the quantity and quality of the food provided, and due no doubt to the Glasgow staff partaking of porridge at breakfast, their demands for dinner, so far as quantity is concerned, are probably less than those of the London staff. I cannot speak as to the boiled custard, but it is a mistaken idea to think that the porridge pot is always kept at boiling point; at the same time, it can safely be said that porridge has contributed to the making of many a braw lad and bonnie Scots lassie!

FAULTY UNDERGROUND CABLE AT LEICESTER.

By LEONARD PRICE, *Local Manager.*

WHILE the experience recorded is doubtless not an uncommmon one, there are one or two features that may be of interest.

The first intimation of the fault came from the party lines, incidentally illustrating the value of the C.B. system over the magneto system in drawing attention to falling insulation of cables.

Several of these lines were found to be partially short circuited. As three distributing points were affected, attention was turned to the main cable.

After opening several joints the trouble was located in a section which crossed the main tramway track. This had been entirely relaid two years ago, at the time of the electrification of the tramway system, and as nothing had been disturbed since, it was conjectured that the damage had occurred at that time, when the old concrete was broken up with steel wedges. This proved to be so; the workmen, with characteristic British thoroughness, had broken up our pipe as well.

When the length was drawn out, a square hole in the lead, which tallied with the point of the wedge, proved the assumption. A small piece of broken pipe was also brought out, and careful measurement showed the break to be in the centre of the track.

The size of the actual fracture of the lead sheath was one-eighth inch square. Neither wires nor insulation were broken. The fact that the fault did not develop for two years was probably due to the new concrete laid over the broken pipe, which kept out the surface water.

The test gave fluctuations ranging from 6 megohms to 1,000 ohms resistance between wire and wire, and showed that the moisture had penetrated towards the centre of the cable instead of spreading over the outer layers.

SOME TELEPHONE MAXIMS.

From a paper by C. W. PIGGOTT, *Manager, Hop Exchange.*

TO OPERATORS.

Do not snap at the subscriber when he informs you a wrong number has been given; it may be your fault.

In answering, say "Number please?" distinctly; otherwise it turns into "Na ple -," and the subscriber is apt to think the operator is slack and indifferent.

Do not call the distant operator over the coals if the answer is not so quick as you expect; the subscriber may put you down as quarrelsome.

Do not talk to your supervisor and answer calling signals at the same time; you cannot serve two people at once.

Do not answer the subscriber, "I didn't cut you off," when he complains. He is not concerned whether you personally did it; the fact remains, it was done.

When you buzz, buzz. One good buzz on the bush is worth ten on the jack frame.

Be ready to help the supervisor; you may be one yourself some day.

Brevity is the soul of telephone working; but excessive brevity may border on impertinence.

That a soft answer turneth away wrath, wrath should always remind you.

TO INSPECTORS.

Do not quarrel with your tools; you may be out of sorts yourself.

Do not yarn to the subscriber; at times he is apt to believe you.

Take a last look round before you leave the instrument; you may discover something, if only dust.

Do not blame the operator too much; lines and instruments *sometimes* cause trouble.

Be polite to the operator; politeness commands attention.

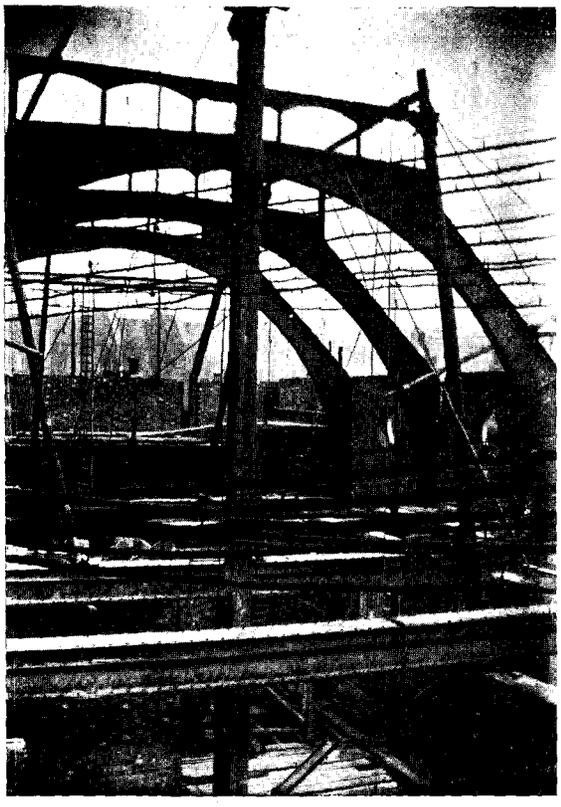
NEW EXCHANGE AT PADDINGTON, LONDON.

By W. A. MILLER.

THIS building when completed will be one of the Company's best exchanges. It will have a frontage of 140 feet, and a width of about 38 feet; the front elevation will be in picked stock brickwork relieved with stone dressings and bands of red brick, and although not ornate, the exterior should be pleasing.

There will be five floors, allocated as follows:—Basement: general stores, heating plant, etc. Ground floor: three spacious offices, small private offices, lavatory accommodation for male staff, etc. First floor: operators' quarters. Second floor: terminal room and power plant. Third floor: allocated entirely as switchroom; the room is 138 feet in length, and will be one of the largest switchrooms in the Company's system.

The building throughout will be of fireproof construction, and there will be an emergency staircase from the switchroom to the



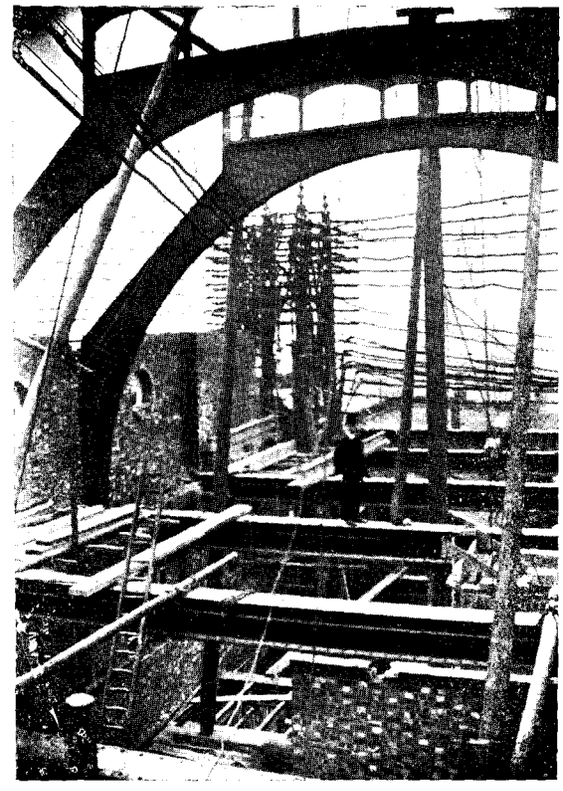
Paddington Premises. View looking East.

ground. The floors will be of concrete reinforced with expanded metal.

Part of the ground floor at the east end of the building will be let off as a motor garage, and very great precautions have here been taken to safeguard against risk of fire, by the introduction of a double concrete floor which, including air space, is 20 inches thick.

As the site of the present exchange will be covered by the west end of the new building, it is of course impossible to erect the entire new exchange at once, but the greater half is now being built, and the photographs will give some idea of the progress of the work; when this portion is equipped the old exchange will be pulled down and the new building completed.

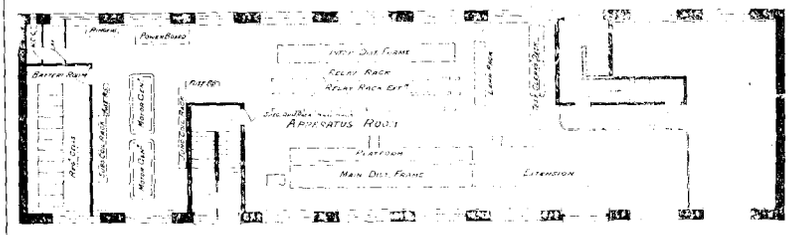
One of the difficulties that had to be contended with was the existing four-pole derrick; owing to its situation two of the poles came inside the new building and two outside, and to add to the difficulty a stanchion of one of the roof principals came in the centre of all four. As the foundations for the building were lower than the poles, these were picked up one at a time, held in position with braces and underpinned, and each pole is now resting on a brick and concrete foundation. This work had to be most carefully done as the poles are unequally loaded; to get over the difficulty of the



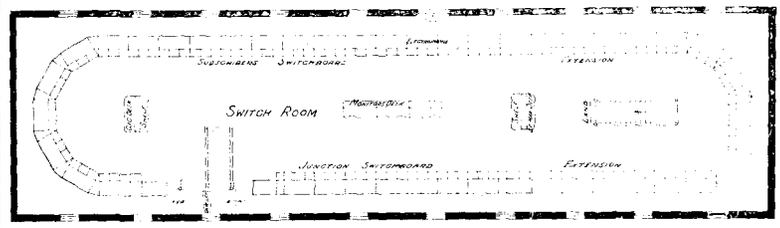
Paddington Premises. View looking West.

roof principal the arms on one side of the derrick had to be shifted and the cables manipulated so as to clear all obstacles.

The following are the chief particulars of the equipment of this exchange:—



SECOND FLOOR PLAN.



THIRD FLOOR PLAN.

SCALE OF FEET

Floor Plans, Paddington Exchange.

Switchroom.—The whole of the apparatus will be of the latest common battery type.

In the part shortly to be completed, the number of subscribers' positions will be 47, and those for incoming junctions 21.

The ultimate number of subscribers' and incoming junction positions will be 127.

The equipment of subscribers' positions will be 120 lines per position, and the equipment of incoming junction positions 27 lines per position; the present subscribers' multiple equipment will be 5,600, multipled every nine panels on the subscribers' section and multipled every six panels on the incoming junction sections. There will be a special section for electrophone working.

The Exchange Manager or Clerk-in-Charge will be each provided with a two-position desk, and there will be a four-position desk for monitors.

Apparatus Room.—The distributing frames, apparatus racks, and power plant will be contained in one large room, a portion of which will be partitioned off to provide accommodation for accumulators, which will consist of one set of eleven cells of 2,376 ampere hours' capacity, with tanks large enough for accommodating plates for 4,356 ampere hours, also one set of four cells of 423 ampere hours' capacity for working the registers.

The distributing frames, relay racks, and register racks will have a capacity for 12,000 subscribers' lines, with the necessary junctions, etc.

The power plant will consist of two motor generators, each capable of giving 500 amperes at 30 volts, and two 150-watt ringing dynamotors with interrupters.

A four-position test clerk's desk will be installed, which can be extended for six positions.

From the foregoing particulars it will be seen that the exchange and equipment will be thoroughly up-to-date.

CATERING AT THE GENERAL POST OFFICE (SOUTH).

WITH reference to the articles on "Exchange Catering Committees," an official of the Post Office Telephone Department informs us that at the headquarters of the Post Office Telephone Service, officially known as General Post Office (South), the clerical and operating staffs dine together and over 1,100 luncheons and teas are served daily. The *menu* offers a choice of 50 dishes, comprising two soups, two kinds of fish, six or seven *entrees*, three joints, six vegetables, twelve sweets, a vegetarian course, chops, steaks, cold meat, dessert, etc. The prices: Soup 2*d.*, fish 3*d.*, 4*d.*, and 5*d.*, *entrees* and joints 3*d.*, 4*d.*, and 6*d.*, vegetables 1*d.*, sweets 1*d.* and 2*d.*, vegetarian course 3*d.*, chops and steaks 6*d.* and 7*d.*, cold meat 3*d.*, and so on. The average daily cost per luncheon does not exceed 5*d.* Tea, coffee, and cocoa cost ½*d.* per cup; two slices of bread and butter and a cup of tea can be had for 1*d.*

The profits made by the Post Office Refreshment Club go to a deposit account and are available for improving the decorations of the clubroom and improving and maintaining the table service. The prices on the *menu* were formerly higher, but it is not desired to make large profits, and after a reserve fund had been established the prices were reduced.

WIRELESS TELEPHONY.

ACCORDING to the *Zeitschrift für Post und Telegraphie*, a practical test of wireless telephony on the Bonserath system was recently made at Cologne. The river Rhine served as conductor, a highly sensitive receiving apparatus being placed close beside the stream. The transmitting and speaking apparatus, with a battery of twenty cells, was connected with a copper wire, the end of which, attached to a large zinc plate, was sunk in the Rhine. By this means conversations were carried on between one bank of the Rhine and the other. The receiving apparatus clearly reproduced speech and song without any extraneous or earthing noises, and the sound effect was so distinct and loud that even the most delicate tones were perceptible. Further experiments were carried on over a distance of five kilometers. Beyond this limit sounds were received, but intelligibility was no longer attained.

This new system may be of utility for shipping and harbour traffic.

HOTEL TELEPHONES.

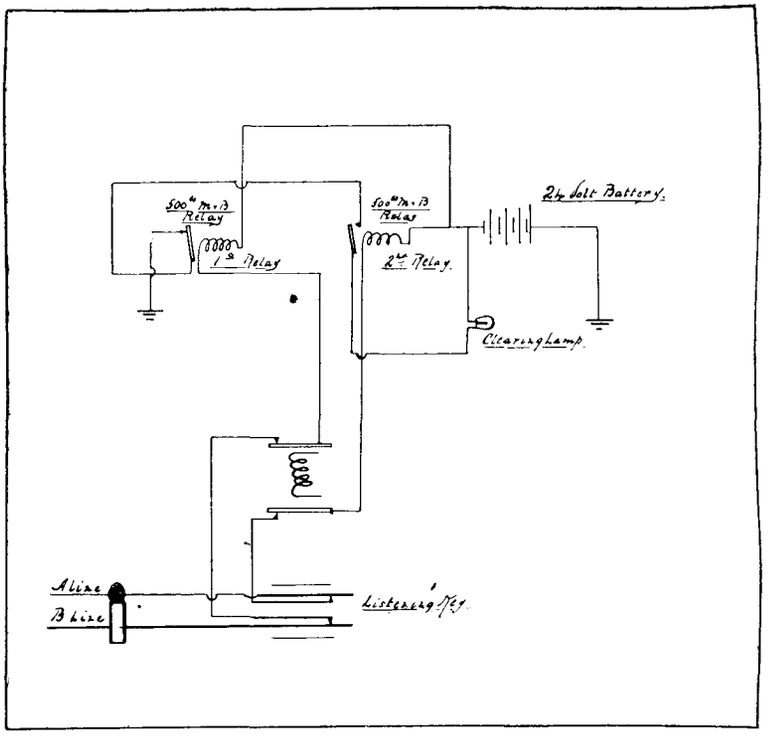
IT is a common thing to find a telephone in every hotel bedroom. There was a total of 25,000 city calls registered at the new Hotel Astor, New York City, for the month of April, 1906, and for the same month 2,500 suburban and long-distance calls appear upon the record. If the other months show similar totals, the aggregate number of calls of all kinds, exclusive of those coming in, for the year, would be 330,000. The total revenue from telephone use is something like $50,000 annually. In February there were 75 Philadelphia calls, 50 Boston, and 503 Jersey City. The hotel does a large telephone business with itself. There are 5,000 interior calls a day, for practically every need or desire of a guest is attended to by telephone. Guests are talked to by telephone as much as they talk. There is an average of 1,000 incoming calls a day, or 365,000 a year. Hundreds of reservations of rooms are made daily by telephone, and thousands of inquiries on every conceivable subject, from the sailing of ocean liners to the price of corned beef hash, are expeditiously answered over the wires. The cashier's desk in every dining room is provided with an instrument by which guests can retain a table for any meal. Every baggage room is similarly equipped.—*Electrical World*, New York.

A NOTE ON "RELAY TALKING."

BY R. CHAMBERS.

IT is now some years ago since I first observed what I have named "Relay Talking," but I remember yet how startling and strange I considered the experience. I am not aware that the phenomena can be utilised to any practical advantage, but, with the idea that a description may be interesting, and perhaps new to some fellow telephonists, I append a brief account of my observations and an attempt at an explanation of them:

In our system of party-line working the cord circuits include two 500-ohm single make and break relays, which are connected as shown on diagram. It will be seen that an earth on "A" will bring down the armature of the second relay and light the clearing lamp, but that an earth across "A B" brings down the first relay as well, and disconnects the clearing lamp. This is the normal condition of the single relays when the cord circuit is in use, and it is under these conditions that the relays reproduce the talking that is



going on over the cords. The distinctness of the reproduction varies, evidently depending upon some nice relationship between the tension on the armatures of the relays, the length of the subscribers' lines, the strength of the battery, &c. In exceptionally favourable cases I have been able to distinguish the conversation at a distance of two yards from the relay.

The explanation that I have to offer is as follows:—

The circuit of the 24-volt battery is completed through the single relays and the secondary of the party-line subscriber's instrument. Now when the subscriber talks and varies the resistance of his primary circuit, he induces magnified variation in the secondary circuit. These impulses are of comparatively high E.M.F., and, while varying in strength and direction, tend either to augment or diminish the current holding down the armatures of the single relays, therefore the armatures of the relays vary in movement under the influence of the varying current and so reproduce the movements of the transmitter diaphragm, and talking is heard from the relays.

SHE: "And what are those men digging the road up for?"

HE: "Oh! they are going to put the telephone wires underground."

SHE: "My word! what deep holes they will have to dig to get those tal poles under."

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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ANCESTOR WORSHIP.

WE are very prone to ancestor worship. Not exactly in the Chinese sense, but in the sense of clinging as long as we can to the ways and practices of our forefathers and resisting as long as possible any change or improvement. So many instances and illustrations of ancestor worship in our legislation, in our business habits and in our social customs could be cited that the catalogue would be unending and tiresome. Each one for himself, from his own experience and observation, can pick out examples of things which continue to be done in an old-fashioned and relatively inefficient way, although it is perfectly obvious that they could be done, and in other places are done in a more modern, better and more effective way.

The telephone is one of the greatest victims of ancestor worship in this country. Partly within and partly without the telephone business. The flat rate method of charging for telephone service is ancestral. It has long ago been demonstrated that telephone costs are dependent on the area served and on the volume of service supplied. Therefore the rates should vary accordingly. But for numerous reasons—too numerous and too complicated to be set out in a brief commentary—it has so far been found impracticable to supplant the general flat rate tariff by a general message rate tariff. Yet, as Mr. GAINE said in his great speech last May, the telephone business will not be placed on the proper lines in this country until the message rate system is adopted. But so many of the influences which bear on the telephone business of the country as a whole combine in the worship of the ancestral flat rate that the fundamental improvement requisite for sound development still lags.

Turning to the outside, to the public attitude towards the telephone service, we find ancestor worship obstructing progress in every direction. First, there are the people who do not recognise the value of the telephone at all. Telephone exchanges are a quarter of a century old. They have been written about in the precise terms of the technical journals and in the looser and more enthusiastic language of the lay press until every person who can read must know that the telephone affords the quickest and most satisfactory means of communication. Yet there are tens of thousands, nay, hundreds of thousands of people, who remain absolutely insensible to the advantages of the telephone service. Their fathers never had a telephone; they have run their businesses or their houses all these years without the telephone; it must be an awful nuisance to be at the beck and call of other people—ancestor worship can marshal many more arguments of the same convincing kind. So these people shut themselves off from one of the greatest conveniences of this electric age, from a service of almost hourly assistance whose yearly performance is worth ten times its yearly cost.

Then there are the people who started twenty years ago with one telephone and still cling to one telephone, although all the conditions—their own requirements and the requirements of their clients and customers—have far outgrown the capacity of one telephone. The areas served by the telephone systems have grown, the telephone users have increased a hundredfold, and the calls made by each user have increased. But ancestor worship makes the man who started with one telephone stick to one telephone, though he may have use for ten or a hundred. He regards the telephone, not as what it is—a means for sending and receiving messages—but as a definite entity, like a clock or a chair. He will not see that one telephone in a busy place means a blocked line, with hundreds of daily callers wearily told "engaged." He will not appreciate that the stream of business borne by the telephone traffic of a city has grown mightily in volume with the years, and that unless he provides his establishment with telephone inlets and outlets in due proportion to his real requirements he chokes his share of the stream, diverting some of it elsewhere, drying up some of it altogether and always worrying and annoying his correspondents. He took the telephone at first on tolerance, and ancestor worship causes him to keep it on tolerance, but to ignore that the telephone service has become an indispensable part of the machinery of business and that, like other machinery, its mechanism and parts must be proportioned to the work to be done. Even in our own ranks there are still a few ancestor worshippers who persist in talking about "renting a telephone" as if the telephone were the representative unit of the business instead of a mere appliance for using the service.

We come to the hotel managers and proprietors. One would think that ancestor worship would be less rife in the hotel business than in other walks of life; that he who caters to the stranger and the wayfarer would welcome improvements which make his house more attractive and tend to keep the guest within doors and make him spend his money in the hotel rather than about the town. In another column we print a note from one of the American electrical papers which indicates the use made of the telephone service in American hotels. Every self-respecting American hotel has a branch telephone exchange, with a telephone in every room in the house. The convenience to the guests of being able to talk all over the city or all over the country from their own rooms is enormously appreciated, and it is a convenience largely availed of; while the internal service is of great value, as it quickens and cheapens the hotel service and encourages the guests to spend money in the hotel, because ordering is easy. Can the British

hotel proprietor see these things? Not for one moment. Ancestor worship asserts itself in the most virulent form. "My guests have always used, for nothing, a single telephone stuck away in a dark and inaccessible corner of the hall, and I don't believe they would use and pay for telephones in their rooms. Such is his invariable argument. It requires but the most ordinary business acumen to appreciate that people *would* use and *would* pay for an additional facility and convenience. The existence of the facilities creates the use. That is axiomatic; and no reasonable man objects to paying for service rendered. But the British hotel proprietor, except a very small minority of him, will not be brought to see that hotel telephone service is now practically a requirement. By and by public demand will have its say, and hotel telephone service will become as general here as it is in America. After a year or two of actual experience the hotel managers will wonder how they ever got on without it. Meantime ancestor worship holds them firmly in its grip.

THE CHEERFUL VOICE.

IN this issue Miss BAILEY, an experienced and evidently a thoughtful operator of the Avenue Exchange, asks the question "Do subscribers appreciate a cheerful voice?" Although in the article the question is not answered very decisively, we have no hesitation in saying emphatically—THEY DO. We cordially and most sincerely recommend all operators to cultivate the cheerful voice. It may be quite true, as Miss BAILEY describes, that there are some subscribers so arbitrary, so dictatorial, and, not to be too precise, so inconsiderate that the cheerful voice seems utterly wasted on them. But it is not really wasted. Man is a thinking animal after all, and even the roughest mannered telephone user, if he finds that the operator is uniformly cheerful and polite, will not remain forever insensible to such treatment, but in time will mend his ways. By the much greater proportion of telephone users who are habitually civil and considerate towards the operators the cheerful voice from the exchange is highly appreciated. It inspires confidence and invests the whole proceeding with an air of efficiency; it makes the subscriber feel that things are going right, and that is half the battle, because to a great many people there is always a feeling of mystery and a certain nervous tension in the use of the telephone service. The lackadaisical, inarticulate reply has precisely the contrary effect. It annoys the subscriber, because it gives him the impression that the operator is not thoroughly interested in her work and is predisposed to make an error of some sort. Both the weary voice and the pert, snappy voice are irritating over the telephone, and both tend to increase the slight nervous tension which the telephone user almost always feels. Good voices at the switchboard are almost as important as good signals and sound cords. Therefore to all operators we would say: Take pains with the voice; be articulate, be distinct, be cheerful. In the long run telephone users will repay you in the same coin.

THE CHEERFUL FACE.

IF a cheerful voice is one of the prime requisites of an expert telephone operator, surely, as Mr. BROWN points out in his excellent article on Contract Department work, a cheerful face is an invaluable asset to the telephone canvasser. We are great reflectors, even the least polished of us. It is hard to reply in a surly way to any remark made in thoroughly cordial tones. It is not easy to greet a smiling face with a frown. If we are chirped at cheerfully we are apt to chirp too, and a smile generally awakens a smile. The telephone canvasser has often to combat prejudice, ignorance and false but deeply-rooted ideas of economy. He knows in his heart and in his head that he is going to confer on the prospective subscriber a great benefit by convincing him that he should take telephone service, and he could bring thousands of sincere testimonials to the truth of this from those who only a short time back were prospective subscribers. But the prospective subscriber is usually on the defensive, and the man on the defensive, if he knows his business, is apt to be aggressive. That is where the cheerful face comes in. It is difficult to be aggressive to a cheerful, smiling, cordial interlocutor. The most surly and morose of men is more than likely to find himself quickly drifting into a cordial argument on the merits of the question if his first objections, perhaps made in rather uncivil terms, are met with cordiality and with an unruffled smile. As Mr. BROWN says, the cheerful face comes like a ray of light in a dull world and is seldom unwelcome. It usually gains an entrance, and it usually gains a hearing, and once the expert canvasser gains a hearing and can back up his cheerful countenance by thorough knowledge of the subject and power of conviction the prospective subscriber is lost—or rather won. It is not given to every man to be a MARK TAPLEY, but cheerfulness can be cultivated, and it is worth cultivating by those who wish to influence their fellows.

OUR MIDSUMMER NUMBER.

THE contents of the fourth issue of the JOURNAL are sufficiently varied and interesting, we trust, to suit all hands. Every branch of our work is represented on some page or other, and between the two covers will be found ample evidence of the range of subjects which modern commercial telephony covers. The operators will find words to interest them both on the moral and material side, words of experience contributed from their own ranks, and they come in for a few enlivening hints from the humorous pen of our own Mr. DOOLEY. The Engineering and Electrical staffs, in the records of technical advance at Hop and Paddington, in Mr. WRIGHT'S article, and in the vivid description of the destruction of the San Francisco telephone system (illustrated in the Supplement), are well catered for; while the Contract men will find useful suggestions from Mr. BROWN and others. The pressure on our space grows from month to month. In order to print several articles that are in the nature of news we have been compelled to postpone the continuation of Mr. COHEN'S invaluable study of "Telephonic Transmission"; several interesting articles on a variety of topics still rest in the editorial safe, and we have even had to reserve for a future occasion some weighty and sound reflections of the Editing Committee.

QUEER FAULTS.

THE case given under the above heading in the April JOURNAL reminds me of a queer fault we had on an earth circuit in the early days. We were connecting a large hotel to the exchange system. Having run the line wire, I set my men to fix the telephone, run leads, earth wire, etc. When all was completed we could get no current through. I put a current on at the exchange and traced all good up to the earth wire, which was properly soldered on to a good lead pipe, which pipe my foreman assured me was the main water pipe. However, on further examination, I found this was not the water pipe, but a beer pipe from the beer cellar to the hotel bar!

THE TELEPHONE CANVASSER.

BY J. R. BROWN, *Glasgow.*

THE days of sitting in one's office and waiting for orders to come in are past, and every man in business realises that if he is to succeed it is becoming more essential every day that he should *push.*

Soliciting orders in every business, great or small, has become a recognised institution, and in most businesses it has become a separate and well-organised branch.

It is recognised that the order department is really the business end of the concern, and, while every other department contributes its share towards the general success, energy combined with concentration on the one idea of getting orders is the backbone of the business.

Every man, therefore, who has an article to sell, whether he be a shopkeeper in a moderate way, a warehouseman, a manufacturer, an engineer, or even a shipbuilder dealing with large affairs, must have his man or men "on the road." Failing that, he lags behind, and while his contemporary is busy, he complains of business being dull. This is essentially the case with the telephone service, because prejudice has to be removed and the advantages of having the telephone have to be made known.

There is no better way of doing these things than by the explanations of an intelligent canvasser.

The prejudice which for long existed against the adoption of the telephone service, as if it were something to be avoided, is rapidly disappearing, and as its utility becomes better known, will pass away altogether.

It is not enough, however, to sit and smile complacently on disappearing prejudice; we must go a step further and show the need for the telephone service.

There is, of course, an enormous number of people to whom the telephone is only a name; they don't understand its capabilities and have never realised their need for it. The canvasser comes in here and takes the *rôle* of friend and adviser.

It is his business to show a man that he can supply him with an article that he needs, through the lack of which he is being seriously handicapped

How to succeed in this part of the business is the question that concerns most canvassers, but no hard and fast rules can be laid down which would meet every individual case, as different men require different handling. There are, however, certain features which are indispensable; without them no canvasser need ever hope to succeed.

First of all, a National Telephone Company's canvasser must have confidence in himself, and confidence in the article he is selling. He must understand that he is the representative of a large Company with ramifications all over the British Isles; that he speaks for a Company that does more for the trade, commerce and convenience of the British public than any other firm existing.

If these facts do not sufficiently impress him, let him remember that the National Telephone service taps every class of business in the kingdom, from the huge works employing thousands of men to the modest chimney sweep; that it is to be found in the homes of all grades, from the castles of Royalty to the cottage of the market gardener.

These ideas understood and thoroughly grasped, with a knowledge of the uses to which the telephone service may be applied, even though he may not know its technicalities in detail, will give a canvasser all the confidence required and show him that he represents a business and seeks to confer a boon which needs no apology.

To get the ear—and the sympathetic ear—of the would-be subscriber is the battle half won, and to accomplish this requires consideration.

The reason why many canvassers fail is because they give no thought as to how they must proceed, and usher themselves into the prospective subscriber's presence not only without ceremony, but without respect.

First impressions are frequently lasting, and to introduce oneself abruptly may create a bad impression, close the door against further interviews, and mean the loss of an order.

The initial step, therefore, to success is respect and deference. No matter what position a man may be in, there is a road to his consideration through politeness. To press for an order even when the prospective subscriber says he does not want the telephone is on the right lines, but to press for an interview when the party does not wish to see the canvasser is a mistake. If a man is busy, worried, or engaged, it is a mistake to insist on seeing him, for the simple reason that he is not likely to be in a frame of mind to consider the question so favourably as if at leisure and in good humour, and the canvasser will consult the interests of the Company better by waiting, or by retiring and calling later on.

Having gained admission, the next question is how to proceed. It is generally believed that the most successful canvasser is a good talker, but talking can be overdone and good business spoiled. It will be found by experience that the successful canvasser is the man who uses his brains more than his tongue—the man who halts on the door-mat and considers what lines he has to go on—who gathers his wits about him so as to be ready for any point that may be raised. That done, he enters without confusion and is prepared for any sort of reception, from the invitation to "have a chair" to the order to "clear out"; from the irritating man who listens to all the canvasser has to say, then simply shakes his head without even raising it, to the man who asks all sorts of questions; from the man who has a good opinion of telephones, to the man who swears at them and all connected with them.

A canvasser must needs explain his business, and the more intelligently and business-like that is done, the better will be the impression made; his style and address will make or mar the interview. If he finds the party interviewed disagreeable he should keep calm; even should he be offensive the canvasser should return a soft answer. This will keep the door open for a further interview, whereas a peppery retort may close it.

It is told of one canvasser who called on a carting contractor at a very busy time of the day, that as soon as the canvasser stated his business, the contractor ordered him to hot quarters; the canvasser's only reply was, "All right, good bye." Next morning, at exactly the same hour, the canvasser turned up and was met by a glaring look from the contractor; but, taking first word, he said, "I've just arrived from where you sent me to yesterday," and the remark so tickled the contractor that it put him in good humour, and an order was booked.

There is so much care and worry in the world that a cheerful face is always welcome, and a canvasser should carry about with him a happy countenance.

A melancholy countenance is depressing and not conducive to business; a bright face acts like a ray of sunshine in a dull world, and the owner is always welcomed.

When prospects of an order seem to be receding, the canvasser may, with profit, divert the subject for a moment by referring to the affairs of the prospective subscriber, a sympathetic reference to his hobby or to something for which he has a liking, and in due course come back to the real business in hand.

A most important thing is for a canvasser to know thoroughly what he is talking about, and to have the different classes of service, rates, etc., in his memory. To have frequently to consult a tariff card, or to grope his way step by step, is unbusinesslike and shows that the canvasser is not master of his subject. It wastes the time of the prospective subscriber, causes doubts as to the canvasser's fitness to discuss the matter of telephones, and, in general, is hurtful to business.

A canvasser should not wait a minute longer than is necessary; but it is a mistake for him to be in a hurry and fidget to get out. He must consult the convenience of the prospective subscriber, call when it suits him, and, even though an appointment has been made, retire gracefully if the time is found to be unsuitable.

Even working on the lines indicated above, the canvasser will find much to discourage him, and will meet many men who would try the temper of an angel. Working his hardest, he will many a day be disappointed with the result, and come to the office in the evening downhearted and with a desire rankling in his mind to kick someone who had that day been particularly nasty; but he

must get above these things and understand that no business is free from worry and annoyance. He must understand that he is an important unit in the great National Telephone Company's staff, and that on his energy and tact much depends. He will find many encouragements in his duties, many people taking him by the hand and giving him a cordial welcome. Also, when he looks around him and sees what telephony has done, the rapidity with which it is extending, and the field for further extension in every direction, he will see a splendid harvest for his energies in the immediate future.

A NOTE ON INSTRUMENT FITTING AT GLASGOW.

BY WILLIAM ALLAN, *Chief Electrician.*

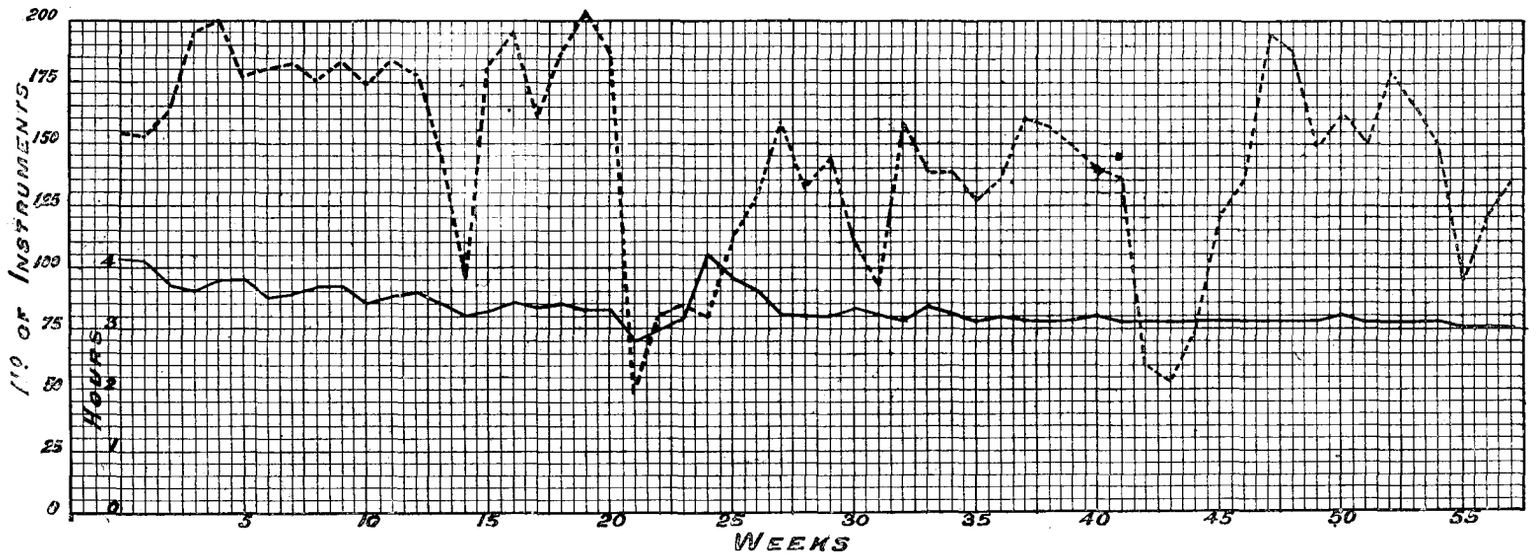
THE accompanying curves may prove of interest to instrument fitters in other districts. The question of what should be the average time for the erection of the ordinary wall-set is one which has of late had considerable attention in the Glasgow district, and the result of this special attention is indicated in the curve shown by the full line. The average time taken per instrument has been gradually reduced from slightly over four hours to practically three hours, at which figure it has continued to stand for some time. The average speed of erection is apparently not affected by the variation in the actual number of instruments which are being fitted from week to week. This figure is given in the curve in dotted lines, and it will be at once noticed that the one curve does not in any way keep step with the other.

To still further reduce the time spent in fitting, the experiment is being tried at the present time of having the instruments delivered by van at the subscribers' premises, so that the fitters can at once proceed with their work without the delay entailed in having to go to the store and obtain the necessary material, which causes a considerable amount of the men's time to be lost. The loss is most felt in such cases where the fitter has to return to the store for a second instrument after the first has been erected. This experiment has not yet proceeded far enough to determine whether the amount saved in men's time will cover the cost of delivery.

A further suggestion has been made that, instead of having the instruments called for by the men at one central store, they might be distributed to various points throughout the district, which would nearly coincide with the centres of the principal exchange areas, and that the men, instead of reporting at the central offices, where the present store is situated, should report at these branch centres, and so save time in getting to the subscribers' premises with the instruments to be erected.

If other centres have any information in connection with this matter which could be communicated to the JOURNAL, it would no doubt be of value.

Number of Instruments Fitted per Week shown on Dotted Line Curve.
Average Time taken to Fit each Instrument shown on Full Line Curve.



MR. DOOLEY ON OPERATING.

(With apologies.)

"Is ut thrue, Dooley, that all new operators are to be taught elocution, an' be thrained in an operatin' schule before dealin' with th' public."

"Yis, Hinnissey, it is quite thrue, there'll be no more cases like that av th' new operator who was an ex dhraper's assistant, on bein' asked fer No. 684, swately rayplied, 'I'm so sorry, 684 is ingaged, but 683 or 685 are at liberty.'

"No, Hinnissey, they'll not practice on th' unoffinding public, and dhrive thim to dhrink be their efforts to plaze, they'll have to go through a coorse av shtudy in 'Ello'-cution (th' pun is intintional, Hinnissey), an' also be thrained in an operatin' schule, there they'll larn not to pull plugs out be th' cords, an' to be a dead shot with th' plug so as not to oblitherate th' numbers av th' jacks. They'll also acquire th' timper av an angel, and larn not to ring back whin some giddy office bhoy sauces thim. I shouldn't be surprised meself if they don't have to go through a coorse av Sandow exercises, an' finish up with a few lissons in foire extinguishin'. In that case, no doubt wan av th' faytures av th' switchrooms 'll be th' row av brass hilmits on th' wall with av coorse a silver-plated wan fer th' ixchange manager.

"In the large exchanges where there are dinin' clubs, spishul attintion 'll be paid to the *maynu*, th' operators 'll not be allowed to have a glorious feed on Monday an Tuesday an thin live 'th simple loife th' rest av th' week. Th' committee, consistin' av th' supervisors an' duly ilicted mimbers from the operators an' prisided over be a 'dietetic' expert, 'll sit in solemn deliberayshun an' compose th' *maynu* for the inshuein' week. Boiled custard with uts accompaniment av three stewed prunes, as was mintioned in th' article on catherin' in th' first number av th' JOUR-R-R-NAL 'll be sthrictly barred."

"Phwy are they only allowed three prunes, Dooley?"

"Hivin only knows, Hinnissey, ivery opirator that I know could ate a good many toimes three. But who knows but phwat more than three 'll sphoil their complexshun, or take th' curl out av their hair."

"Now, Hinnissey, turnin' from th' ridiculous to the sublime, phwy shouldn't there be competitshuns betwin the operators av th' different exchanges av th' counthry, an' th' raysults published each month in th' JOURNAL. Phwat I suggest is, that a team be silicted from the operators, an' their posishuns be put under observayshun, an' th' averidge toime av answerin', complaytin' th' conniction, an' th' clearin' be worked out. To inshure that th' subs. do not suffer, marks should be diducted fer misthakes, such as wrong number being called up, loines bein' taken whin ingaged, or loines bein' cleared premachurely, th' raysults to be certified be th' D.M., an' sint up to th' H.O. fer adjoodicashun. This 'ud create a spirit av hilthy rivalry among th' operators, would improve th' service an' benefit th' gineral public. Th' team would av coorse be silicted be th' 'powers that be' in the switchroom. I ixpict that some av th' more inthusiastic av thim would go in sthrict thrainin fer th' ivints, possibly some av thim would adopt th' *Daily Mail* egg theory, an' thin afther some prayliminary investigashuns th' raysults cud be dhrawn up in a curve showin th' number av calls answered per boiled egg per hour, an' the number per poached egg per hour, an' so on; from these figures a suitable diet would be hit upon so as to obtain th' best raysults. Th' operators av coorse would have to give up shmok—I mane chocolates and other luxuries—an' tackle the job in earnest.

"Possibly th' Tillyphun Company might give a cup or a shmall shield to be held be th' winnin' team fr a month. Av coorse C.B. exchanges ud be grouped togither, magnayto call an' clear exchanges togither, an' any call-wire exchanges or sich like relics av th' Sthone Age 'ud compayte amongst thimsilves. May be some systim av handycappin' cud be divised so that C.B. teams could compayte fairly aginst magnayto teams fer th' championship av th' kingdom."

"Some competishuns like these 'ud make intherestin' raydin' fer th' JOURNAL, Dooley."

"Yis, Hinnissey, ye've about hit ut there. I daresay we should be raydin' articles somethin afther this shtyle.

"CHAMPIONSHIP AV TH' KINGDOM.

HOP *v.* LIVERPOOL (ROYAL).

NARROW VICTORY FER TH' 'HOPPERS.'

"Th' followin' is a brief descripshun be our Sphorting Corrispondint:—

"Be dafaytin' th' Liverpool team yisterday th' Hop team gained a meritorious victory, an' brought th' cup south to th' Mitropolis fer th' first time. Punchually at 2.30 th' 'Hoppers' took their places at th' board, each mimber lookin' as fit as th' proverbial fiddle. Fer th' first fifteen minutes things were raythur quiet, but towards 3 o'clock th' lamps began to flash quicker an' quicker, an' th' rattle an' click av' th' plugs incraysed; this culminated in a terrific rush which taxed th' power av' th' team to th' utmost, but th' 'Hoppers' were ayqual to th' occasion an' dishposed av th' calls with lightnin' raypidity. Mintion must here be made av th' foine offensive work av Miss de Smythe; th' speed and dixterity with which she handled th' plugs an' keys an' answered th' calls was a soorce av amazemint an' delight to th' priviliged spictators.

"Whin th' interval arrived at 3.30 a missage was rayceived from Liverpool givin' a rayport av th' progriss av th' game, an' it was seen that though doin' well th' 'Royalists' were bein' led be 1·9 siconds. On th' raysumption av th' game th' 'Hoppers' stharted off at a great pace an' made it pritty ividint that th' 'Royalists' would be hard pressed to win; shortly before th' close av th' game another missage came through, an' it was seen that th' 'Royal' team were makin' a shuprayme iffort to draw livil. This only spurred th' 'Hoppers' on to greater ifforts, th' prissure l ein' kept up to th' ind, an' th' team thin raytired amidst th' subdued applause av th' onlookers. Whin th' final figures came through it was seen that Hop had won be th' narrow margin av ·8 siconds.

"Fer th' winners Miss de Smythe played a great game, an' was adjudged th' bist player in th' room. Siviral av th' others shone well in difince, th' clearing bein' raymarkably prompt and sure."

"Do ye think we shall iver have anythin' like that, Dooley?" said Hennesey, greatly excited.

"No, Hinnissey, I *don't* think, I'm afraid we must put business before sphort.

OUTING CLUB AT GLASGOW.

BY A. M WATT.

WHILE this sweltering weather continues and one goes about from day to day sighing for holidays, picnics, etc., it may not be out of place to tell of a club—"The Royal Bohemian Club"—to give it its official title, which we Glasgow office men have started this season.

In the first place it may be mentioned without fear of contradiction that our large office, situate as it is under the pavement of the Royal Exchange, is scarcely a health resort, and it therefore behoves us to prime ourselves from week to week, if we are to continue to fight on the winning side in the telephonic battle still being waged in Glasgow. Last year we organised a rambling club for Saturday afternoons, and I can most thoroughly recommend this form of recreation as at once cheap and healthful. We toured all round the immediate neighbourhood of Glasgow; one of our rambles took us to Balloch, where high tea in a hotel on the well-sung "Banks of Loch Lomond" brought one of our most enjoyable outings to a finish.

This season we have gone one better and formed a week-end camping club. Our membership numbers twenty and the initial outlay involved in the purchase of a tent, with floor, beds, blankets, stove, and sundry dishes and other utensils, was met by a subscription of 1*s.* per week from each member for nine weeks prior to the start

A most suitable position for the tent was kindly granted by Sir HUGH SHAW STEWART, Bart., in a wood on his estate at Inverkip, on the Firth of Clyde, where we are near to the station (a great consideration on Monday mornings), near to the sea, near to the road, near to a friendly boatman who keeps our goods for us, and close to a delightful stream of clear sparkling water.

The tent accommodates ten men, and we have divided our members into two groups, each group taking alternate week-ends.

So far, the idea has worked admirably. The weather clerk has done his part well, and we in ministering to the inner man, have developed powers, till now undreamt of, in the culinary art. Last Sunday, for instance, we put our pot of potatoes on the stove to boil at 1.40 and they were ready by 4.20. I cannot tell what went wrong, but we felt really hungry by that time, and took the potatoes then "for better, for worse." Afterwards we had "milk pudding"—an "Eiffel Tower" delicacy. One often gets milk pudding at home, but no—there is a subtle fascination about the camp production which language utterly fails to describe—and what does it matter if someone did find a fly in his portion! If this American meat scandal had not been in the air at present, I would have mentioned that we had "tinned meat" along with our potatoes, but in the present state of public opinion, I have deliberately refrained from mentioning the gruesome fact. We are, however, all doing well.

The cost per member per week-end, including a railway fare of 2*s.* 2*d.*, works out at about 4*s.* when the group turns out in strength, and when boating is wanted, an extra 1*d.* or 2*d.* per man, with a little economy in the *menu*, is all that is required. "Efficiency with economy" is our motto here as well as in our business capacities, and judging from the sunburned faces and buoyant spirits of the campers every Monday morning the efficiency of our camp in making the weak strong, bringing back the colour to pale faces, and routing "that tired feeling" is undoubted.

We take an occasional visitor at 1*s.* per week-end over and above the ordinary expenses of the group, or, where a non-member cares to spend a week under canvas we ask a contribution of 5*s.* to our funds, so if there are any of our office friends in other districts who would care to risk their lives, we shall try to arrange matters for them, believing that, given good weather, they can spend at Inverkip a most enjoyable and exhiliarating holiday.

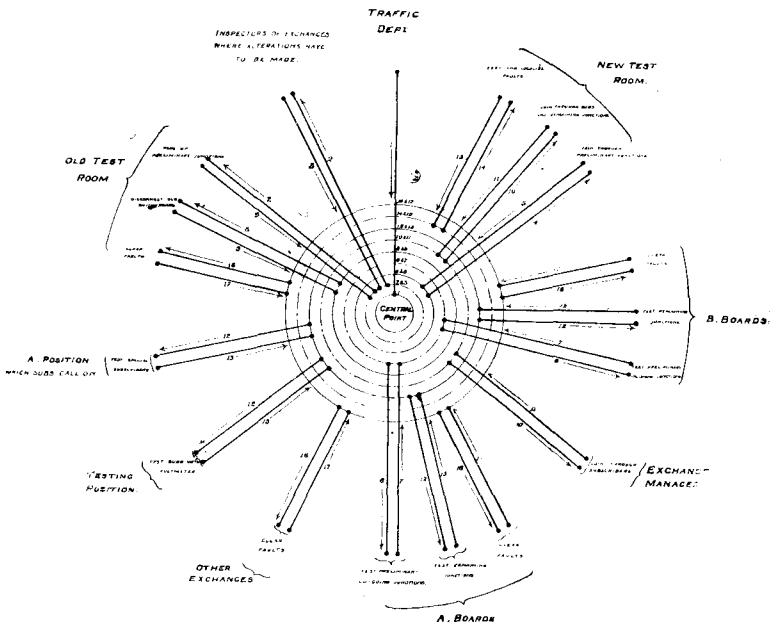
THE GLASGOW & SOUTH-WESTERN RAILWAY announce facilities for golfers in reaching certain well-known golf links in Scotland. Dining and sleeping car conveniences both from St. Pancras (London) and St. Enoch (Glasgow) are available. The journey to Prestwick, Troon, Barassie, Gailes, Bogside, Ardeer and Turnberry occupies less than an hour from Glasgow.

TRANSFER OF HOP EXCHANGE FROM MAGNETO TO COMMON BATTERY WORKING.

By G. F. GREENHAM.

THE new exchange was successfully opened on March 17, 1906, the following lines being transferred from the old exchange, which was immediately opposite the new building :—

2,633 exchange lines (with 4,900 stations).
1,057 junctions.
1,072 through lines.



Some time prior to the opening, dry-core cables had been run by the engineer's staff through a subway crossing the road dividing the two buildings and teed on to the existing cables. The exchange inspectors were occupied many weeks in the old testroom checking the testroom records with the engineers, and every through junction and private wire was proved by being spoken over to the distant ends.

The through junctions and private wires were cross-connected on the new main frame, and after working-hours during the week preceding the opening, heat coils were inserted in the arrester bars, and at the same time insulating pegs were placed in the old test jacks.

These through junctions have been arranged in alphabetical order, according to the code of the exchange at the outgoing end of the line, so that all the outgoing junctions from one exchange are together on the main frame ; but owing to the limited accommodation provided it has not been possible to allow for this order to be maintained in future. This is not, however, a matter of vital importance.

The work on these lines was completed, with practically no interruption to the service, on the Thursday night preceding the transfer, so that it was not necessary to give any attention to them at the time of the actual transfer.

The subscribers' lines were cross-connected on the main frame and carefully tested out. The work of distributing the lines to the Traffic Department requirements was carried out by the contractor's men. The work of joining up and testing the direct junctions was a matter of considerable magnitude, owing to the large number of junctions and to the many different circuits involved. The contractors made the necessary connections on the intermediate distributing frame for the outgoing junctions. The ringing junctions to the exchanges, of which there were a large number, had to be wired to an entirely new circuit at the distant exchange, and the major part of the testing was required on these. The testing of the junction circuits was carried on in the evenings as soon as the lines were available. As far as possible, matters were so arranged that it was only necessary to withdraw an insulating plug from one test jack and insert it in another in order to allow a junction to work under the new conditions ; this was not in all cases possible, and a certain amount of work had to be done at the actual time of the change-over. One important point that had to be arranged for was the re-numbering of the junctions ; for on the new board the numbering of the lines runs consecutively, whereas on the old board the lines were numbered all odd or all even, according to circumstances.

The actual procedure to be adopted in making the transfer required considerable care and forethought. The Engineer-in-Chief issued a specification accompanied by a diagram showing in what order the various operations were to be effected. The scheme, briefly summarised, was :

(1) To transfer to the new exchange, and test out, the first half of the junctions from and to each exchange, maintaining the service to the old exchange on the second half.

(2) To transfer the subscribers to the new exchange and maintain the service over the first half of the junctions.

(3) To test the second half of the junctions from the new exchange.

The diagram shows graphically the order of the various operations. There was only one departure from this, and that was that the men at the distant exchange were advised beforehand to start altering the preliminary junction circuits at 2.30 sharp, without waiting for further advice.

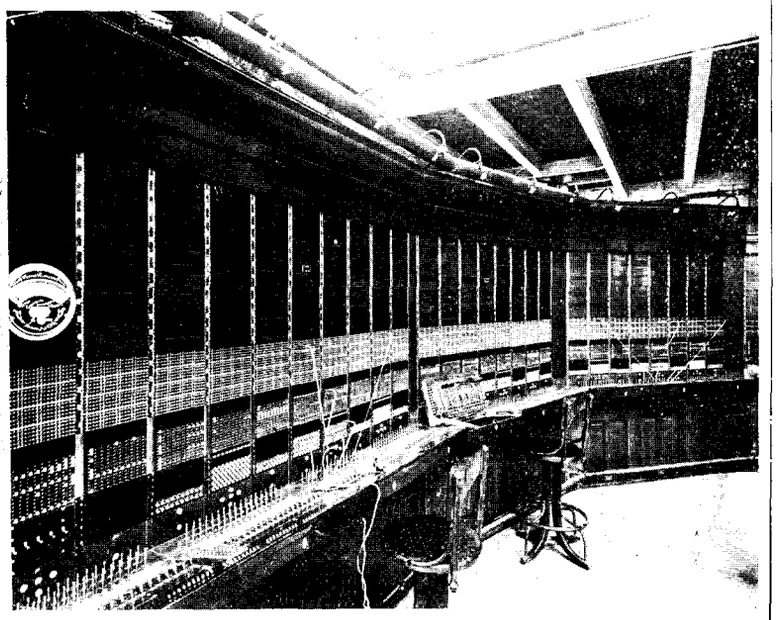
It was decided to have a docket made out for each junction line and to distribute these dockets to the men told off to do the testing. At the Hop Exchange the A boards are on one floor and the B boards on another, and it was decided to divide up the work of testing junctions between twenty men and four foremen. Two foremen, each with five men, dealt with the outgoing junctions, and a similar number of men dealt with the incoming junctions. Each foreman was provided with a ruled schedule showing each junction to be tested by his men, and the necessary dockets previously made out and divided into sets, each set being placed in an envelope bearing the name of the tester.

Hop Exchange, General View.

Each man received typed instructions explaining to him exactly what his duties were. The procedure to be adopted in dealing with the dockets was as follows :—

As each line was tested the result was to be endorsed on the docket and the docket handed to the foreman of the group, the foreman was to mark off all O.K.'s on his list and forward the docket to the controller at the central point. If a line was faulty it had to be tested to the cable bars at the distant exchange, and if

the fault proved to be towards the Hop, then the docket was to be endorsed accordingly and sent through to the controller for dispatch to the test clerks. The controller was to mark off each O.K. on his list, and to book out the dockets which were not endorsed O.K. to the department concerned (test clerk, exchange inspector, etc.). By this method it was possible for the controller to see exactly how matters stood and what proportion of lines were faulty.



Hop Exchange, "A" Sections.

The front surfaces of the test jacks in the old test-board of the first set of junctions were plainly marked with chalk, and it was only necessary to press home the wooden insulating pegs which were already partially inserted in the jacks and to insert heat coils in the corresponding lines on the main frame in order to throw these junctions on to the new switchboard.

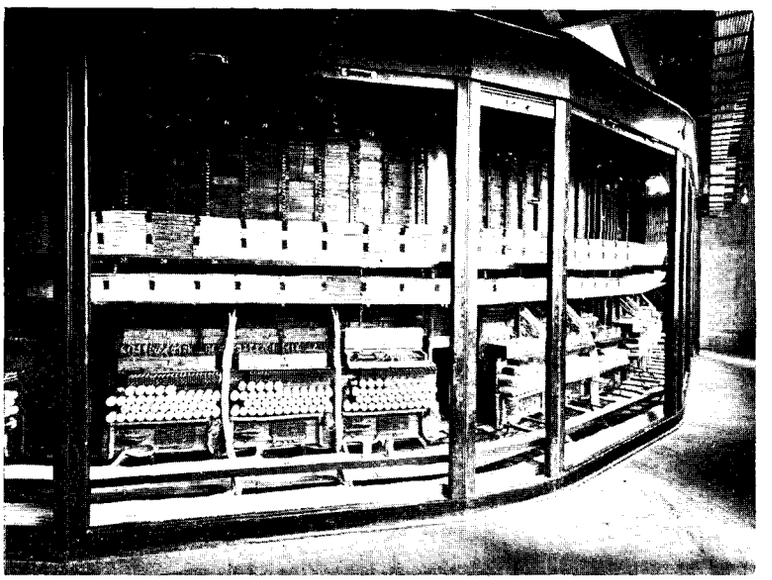
In order to facilitate the work of testing, ten lines were picked up on the multiple and distributed on answering positions of the old exchange and the new, so that any tester could call up an operator and request her to instruct any particular exchange inspector at a distant exchange to speak on a junction. By that means it was not necessary for any tester to leave his position and much valuable time was saved. Provision was also made so that men testing outgoing junctions on the A floor could test those outgoing junctions appearing only on the B board multiple by means of local junctions and without moving from the A positions. Apart from the time saved, this arrangement was decidedly conducive to orderliness in the working. As soon as the first set of junctions were proved to be O.K. the remainder of the junctions and the subscribers' lines were cut over. Square microscope cover glasses had previously been inserted between the springs of the subscribers' cut-off relays and the heat coils inserted in the main frame, and strips of tape had been passed behind each set of heat coils on the heat coil bars in the old testroom and tied in front. All that was necessary to throw the subscriber's lines on the new board was to pull the tapes so as to remove all the heat coils and then to plug in each line at the new switchboard in order to release the glasses from the cut-off relay contacts. The work of plugging in the lines was done by the operators, and each operator was supplied with a short-circuted plug which she plugged into each line after the cut-off relays had been worked, in order to see whether the line lamp would light a light proving that the glass separator had fallen out. The "no glows" were reported to the controller by the exchange manager for attention.

The work in the testroom was carried out by a foreman with five men under him and in the new testroom there were a foreman and three men. When all the lines had been transferred to the new exchange the testing operator started the test on all lines with the voltmeter. Inspectors and line faultfinders were kept in readiness to attend to outside faults, alter instruction cards in call-office cabinets, etc.

The controller in charge of the change-over was provided with a C.B. cordless switchboard with lines to the main switchboard and to the various foremen, and in addition lines were arranged between the most important exchanges and Hop with C.B. instruments at the distant exchanges, so that direct communication could be obtained with the inspectors making alterations. The controller dealt with the divisional electricians of the various districts, and the divisional electricians transmitted the instructions to the men working in the various exchanges in their districts.

The transfer started, as had been arranged, at 2.30 p.m. sharp. At this time the men stationed at the distant exchanges made the necessary alterations to the first set of junctions, and the foreman of the old testroom was instructed to plug up those junctions. At 2.34 advice was received at the central point that the lines had been plugged up, and the foreman in the new testroom was instructed to insert heat coils in the junction lines. This operation took twenty minutes At 2.55 the testing of the junctions was started, and was completed at 5.55. This work would have been finished earlier had it not been for a misunderstanding on the part of the Post Office people, who did not make the alterations at the proper time.

At 5.55 the six men in the old testroom started to pull out all the heat coils in the 151 strips, and completed the work in exactly five minutes. The heat coils in the final junctions were inserted in the new testroom in 35 minutes. The work of plugging in to the lines at the local jacks was carried out by the operators, who had now been transferred to the new building, and the glasses in the cut-off relays were released; on testing with the short-circuited plugs only 27 "no glows" were noted. By 7.30 the test of junctions was completed and the result showed that the junction service was practically normal, so that the majority of the staff were released from duty; the local staff remained to deal with the subscribers' lines. A complete re-test of the junction was made on the Sunday, and at mid-day only ten incoming and six outgoing junctions were known to be out of order. During the remainder of the day the efforts of the staff were mainly confined to the testing and localisation with the outside staff of faults on subscribers' lines. The first test gave the following result:—



Hop Exchange, Back of "A" Sections.

Low insultation and earths	81
Disconnections	26
Loops, short circuits, and A line earths causing permanent glows	57

The number of faults cleared during the period from the Monday to the following Saturday was 399 as against 433 during the

corresponding period for the previous week. The decrease is accounted for by the drop in exchange faults from 216 to 72.

The success of the transfer was due to the thoroughness of the testing carried out previous to the transfer, both on the new switchboard and on the lines, and to the thorough and excellent arrangements made by Mr. RIDD, the Divisional Electrician, and to the willing way in which all concerned carried out their work.

DINING CLUB AT HULL MAIN EXCHANGE.

BY MISS L. M. GIBSON, *Chief Operator.*

I WAS much interested in the article on exchange catering which appeared in the JOURNAL for April, and would like to give a short account of our dining club in Hull.

It is now five years since the club was formed (when the exchange in Mytongate was opened), and I can truly say that it has been appreciated to the fullest extent.

Previous to this a large majority of the operators had to dine off sandwiches, etc., while others had their dinners sent in from a neighbouring restaurant. This, however, was not at all satisfactory, as the dinner would sometimes arrive fifteen or twenty minutes late; while in some instances the operator, after patiently waiting for the best part of her dinner hour, would have to go round to see if she had been forgotten.

Can anyone imagine, after such experiences as these, what the feelings of the operators were when they heard that a cook was to be engaged and a dining club formed, which would enable them to have dinner on the premises at a moderate price!

With respect to the cost of the dinners, each operator pays *1s. 9d.* per week. At this price we are able to pay our way and keep a little in hand. Certainly we do not go in for accumulating a large balance, but rather for charging as nearly as possible what the dinners cost.

Regarding the difference of expense in some exchanges compared with others, I think that to a great extent the cook is responsible for this, as some cooks are much more extravagant than others, the result being that the operators have to pay for it.

Our usual bill of fare consists of such things as roast beef, mutton, or pork, veal or beef and kidney pies, fish, minced beef, boiled rabbits, rabbit pies, etc. The puddings, too, we vary as much as possible, although this is rather a difficult matter in the winter time, when there is no fresh fruit to be got.

We have no particular day for certain dinners, but vary our bill of fare according to what is in season.

BENEVOLENT FUND.

A GENERAL meeting convened by the committee of the National Provident Club (Headquarters, 6-8, Marshalsea Road), was held at Salisbury House, London Wall, E.C., on April 26 last, to discuss the advisability of forming a Benevolent Society for the provision of help in cases of distress occurring amongst members of the London staff.

The meeting was attended by about 200, and Mr. R. J. PAYNE, was elected to the chair. The Chairman briefly explained the objects of the fund, and it was unanimously agreed that such a fund should be started.

Mr. CLAY addressed the meeting, and quoted one or two instances in which much good could have been done had the proposed fund then been in existence.

A committee and the necessary officials were elected, and it was arranged that the entrance fee should be *3d.* and the contributions *1s.* per annum, payable in two half-yearly instalments.

The committee were empowered to formulate rules, to be submitted at a further general meeting held in the Great Hall, Salisbury House, on May 23, 1906.

It is confidently anticipated that practically the whole of the Metropolitan and Head Office staffs will been rolled as members, in view of the good work which can be done and considering the very small annual contribution invited.

The officials and committee appointed are:—President, Mr. R. J. Payne; Treasurer, Mr. J. Leslie; Trustees, Mr. R. Bryson, Mr. H. Davis, and Mr. L. Harvey Lowe; Committee, Miss Butcher (London Wall), Miss Hiley (Southern), Miss Peet (Office L.W.), Miss Ralph (School), Miss Richards (Gerrard), Mr. C. W. Appleby (Hop), Mr. G. F. Brown (Hop), Mr. G. H. Gallard (Western), Mr. J. A. Hunt (North), Mr. C. Kerridge (Workshop), Mr. H. Martin (City Stores), Mr. W. J. Martin (East), Mr. J. Moon (White Lion Street), Mr. D. Stuart (Head Office), and Mr. A. Watts (White Lion Street).

A meeting was held on May 23 at Salisbury House and passed rules for the society.

Mr. Clay announced that the directors would give a donation of £50 to start the fund.

The secretary, Mr. A. T. Waller, will now be pleased to enrol members and give further information at Salisbury House.

AN EFFICIENT STAFF.

BY EDGAR J. FRASER.

EFFICIENCY of the staff is an essential condition of the Company's progress and prosperity, and the question of how best to secure it and maintain it is ever with us. Particularly is this so in the larger districts of the provinces, where the four branches of the staff touch each other at innumerable points.

To secure efficiency in any department, and therefore in every department, two things are necessary. First, interest on the part of the workers themselves, which will ensure punctuality, perseverance, and politeness; and second, interest and encouragement on the part of managers. These are the elements which, when present in the right proportions, yield efficiency as their result.

It will be generally conceded that the interest of the worker follows in natural sequence his engagement, and increases, for is not our work above most, if not all others, calculated to awaken and deepen it? Can it be said that the interest and encouragement of the managers follow in like manner? Is not trivial condemnation used much more than trivial commendation? Do district managers and contract agents, chief engineers and electricians realise their power to promote and maintain all-round efficiency by occasional commendation? It is a power which, wisely used, will yield more satisfactory and more permanent results than the annual, if more general and prosaic, medium of Form 58. An expression of pleasure at good work done is the most potent influence for good which managers possess. I can recall that the first words addressed to me by the gentleman under whom I serve now were words of praise, words which have proved a valuable encouragement; and who shall estimate the ultimate results of such words of appreciation and encouragement? Alas! that in many cases such words are never spoken; the events which should evoke them are to all appearances as unnoticed as those of ordinary routine. Possibly they are regarded as what is to be expected from good servants, but even good servants may get discouraged unless some slight acknowledgment is made from time to time.

I commend the experiment, then, to all heads of departments, particularly to district managers and contract agents, whose staffs' work cannot cease with the stroke of six, but continues in the recesses of the mind always.

THE TELEPHONE IN AGRICULTURAL DISTRICTS.

IN a printed answer to a question by Mr. H. H. Marks in the House of Commons last month, Mr. Sidney Buxton, the Postmaster-General, stated that he had been in communication with the Board of Agriculture as to the best means of extending the telephone system in the fruit-growing districts of the country, and the circumstances of the particular districts, to which the Board had drawn his attention, were being investigated. During the last two years the Post Office had opened 127 exchanges in country districts, and a considerable number of others were being constructed. He hoped that the arrangement lately announced by the Chancellor of the Exchequor, under which the Post Office would assume two-thirds of the liability under guarantees for the extension of the telephone trunk-wire system, would facilitate such extensions.

CORRESPONDENCE.

THE COMPANY'S CORRESPONDENCE CLASSES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I THINK the reply given by Mr. Prentice is very satisfactory. I should be in favour of having the papers all bound and indexed, even if one shilling extra were charged, as I have had to pay to get mine bound.

As to interest taken in the classes, I don't think letters such as Mr. Parkinson writes will do any good. When lads enter the Company's service they *come to be taught by the officials of the Company, not to teach them*; at least I think that is part of my duties. Mr. Parkinson is surely aware that they are not examined in technical telephony when they join the service.

The classes are all right, and the employees are very pleased that the Company took them up; also the membership will increase each year sufficiently to encourage the Company to keep them going. I agree with Mr. Mann that all members of the class should get Gunn's book on arithmetic, as it would be a great help to them.

I was very pleased to read Mr. Valentine's letter, and agree with all he says regarding the right class of inspector. I do not know what queries are asked of him, or of other officials of the Company, but my experience is that because no definite answer can be given as to what wages will probably be paid, say, after six years' service, parents do not think the outlook satisfactory. The result is we do not get the best class of inspector. I think that if the district managers could inform a lad what his wages would probably be for say, eight years, it would do away with this uncertainty and dissatisfaction at the start. The result would be a better class of men, a class which would take more interest in the classes and in the work generally.

Referring to Mr. Poulton's letter, I regret to say I have suffered like him from the "Don't cross that line" principle, and I feel sure the Company suffers very much from its prevalence. I don't think there is any other kind of business in which grand success depends so much on all departments working hand in hand. Those who snub their co-workers should remember that to impart knowledge to others does not diminish their own store of knowledge.

As to the JOURNAL, we are all very pleased with it, and wish it every success. JOHN H. C. BUCKLITSCH, Chief Inspector.

[NOTE.—The correspondence on the Company's Correspondence Classes must now be considered closed.—*Ed.* "N. T. J."]

INSULATION TESTING.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IN making a recent test for insulation resistance with the Silvertown testing set on a 50-pair D.C.C. (565 yards long) it was observed that when all the "A" wires were tested against all the "B" wires earthed, there was a deflection of nine divisions on the galvonometer scale, and upon equally dividing the cable and testing half the "A" wires against the others earthed there was a deflection of six divisions *on each half*, and upon dividing again, and testing a quarter of the "A" wires an approximate deflection of four divisions was obtained on each section.

All the "A" wires were branched together again and the original deflection, viz., nine divisions was obtained.

Can any reader suggest a reason why the deflections are not inversely proportional to the insulation resistance. "SHEFFIELD."

REGISTERING CORRESPONDENCE AND FAULTS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I MUST congratulate Mr. Dalzell on raising a most interesting subject, and trust his hopes may be realised. There can, I think, be very little doubt that uniformity in dealing with this subject would lead to better results.

CORRESPONDENCE.—The system I have followed for many years differs from that described by Mr. Dalzell, inasmuch as I have the letter registers indexed, and all letters are filed under a separate filing number for which a special column is provided, as shown by the following heading :—

Date received.	No	Filing No.	Name.	Subject.	Complaint.	Issued to.	Date returned.	Remarks.

Unless a letter is initialled for filing it is kept in a correspondence basket in case of further letters on the same subject, when it is a simple matter to find and attach the papers. This is done first thing in the morning by the clerk who opens the letters, the result being when there has been any new correspondence on a subject the whole of the papers are before you, and there is no difficulty in referring to any letter on the subject.

When the time has arrived for filing, the uppermost letter in the batch is initialled, and the papers are handed to the filing clerk, who marks off all the numbers filed by placing the *filing number* against each letter, so that it is readily turned up at any future time. The batch is then bundled together with as many more similar bundles as are sufficient to fill an ordinary filing case, Before they are put into the case a strap is placed round the papers to keep them together.

It should be mentioned that in filing the letters the numbers in the third column are taken from the papers that are filed, in numerical order, so that it matters not what batch you require, it is only necessary to turn to the register, look up the index, find the letter under the heading, then turn to the page, and you get the filing number. The system works well, and the great advantage is that the time spent in filing the papers is reduced to a minimum.

FAULTS.—When the district office is not in the same building as the exchange, faults reported by letter to the district office should, I think, be telephoned to the fault clerk, who should give the clerk reporting the fault the number under which it is to be entered in the register, the letter being sent on for report in the usual way. This saves time in dealing with faults.

Coventry, June, 1906. JNO. MEWBURN, District Manager.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE letter of Mr. Dalzell's which appears in the June number is one from which much benefit is sure to be derived, and the discussion of the subject, showing the various methods adopted throughout the country, should ensure—by selecting the bests points of each—a really good and uniform system on practical lines.

The method in vogue at Bristol of entering up the Letters Received Register is, I think, the one generally in use in most districts, but, with the exception of the cash entries, the contents of the register are indexed in some districts; this, I think, is an advantage, the time spent in indexing being more than compensated for by the time saved in finding an entry when required, as this can be done much more quickly from an index than by searching entry by entry throughout the book.

In the East Kent district one file only is used for all correspondence, that is, general letters and service letters are not kept in separate cases. The ordinary daily letters received, with the carbon copy of replies attached, are filed right away in "date" order and not alphabetically, all letters, say, filed on April 14 would be put away in a case plainly marked, say, "*From April 12 to 16*," and all letters filed between these dates would be found in the case so marked, spacing paper being placed between each date.

The letters are indexed in the Letters Received Book Index under their *subject* (and name in case of general letters) and when filed the date of filing is stamped on each letter and in the extreme right-hand column of the Letters Received book, opposite the corresponding number of the letter filed, so that by turning to the index we get the number or numbers of the letters required and by referring to the numbers in the body of the book we find the date on which the letters are filed. Each letter filed has placed opposite its entry in the Letters Received Register the "date filed."

Correspondence which is likely to be more or less protracted and which runs into batches is kept in the first place in a cabinet, the drawers having reference numbers, and as the correspondence proceeds the letters received on the subject and the carbon copy of replies are attached to the batch each day until the matter is finally disposed of when the batch is filed in the same way as above described. Some of the letters might be dated January, some February, some March, but being in a batch they are all filed on one date and that date can be found by referring to the corresponding number in the register of *any* of the letters received on the subject.

The only exception made to this mode of procedure is in the case of *very large batches*, which are kept in special cases and under a special index.

This method was adopted more than twelve months ago in preference to the alphabetical system, the difficulty with the latter being that one never could be quite sure under what particular letter the correspondence might be filed. Even in the smallest batches the General Manager, Engineer, Provincial Superintendent, Storekeeper, etc., may have had something to say, so that the chances were equal as to whether it was under G., E., P., or S., or under the subject matter heading, which was also liable to variation.

The numbering of the cases as is done at Bristol (and probably in other districts), in addition to dating them, is a wonderful time-saver when looking for the case wanted, and this addition has been made to the system in this district, the case number being also entered in the register beside the "date filed."

The practice of putting in slips with particulars of letters removed is also one which highly commends itself, and will doubtless be adopted by all districts which do not already take this very necessary precaution when re-opening correspondence.

REGISTERING AND DEALING WITH FAULTS.—The system here of dealing with faults is similar in principle to that at Bristol, the only difference being in detail, and this is due to the difference in size of districts.

All complaints received, whether written, telephoned to office or operator, or given verbally over the counter, are reported to an official whose duty it is to make out a fault form for each, and this is done in strictly numerical order. The forms are then passed to a clerk who deals with their distribution and fault recording. The subscriber's card is taken from the cabinet and placed in the distributor until such time as the fault form is returned by the inspector or fault-finder; the clerk responsible is thus in a position to watch carefully the duration.

When faults are cleared and forms returned a final post card, advising the subscriber of clearance is sent (in cases where fault has been reported in writing only), the necessary entries are made, cards are replaced in the cabinet and forms filled in numerical order, a missing number at once giving rise to enquiry.

I think it must be generally admitted as suggested by Mr. Dalzell that the conditions which obtain at the majority (if not all) of the Company's offices are such that uniformity of method in dealing with most matters should certainly be possible; a free and full discussion of various practices should result in bringing the districts into line in many things, and so approach the uniformity which is so desirable.

Canterbury, June, 1906. H. C. MURRAY.

TELEPHONE SOCIETIES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WOULD "X" or any other equally interested member of the staff supply a sample syllabus of his Telephone Society, and give a rough idea of the expense, subscriptions, etc., connected therewith, through the medium of the JOURNAL, so that the staff at the thirteen large centres named in his letter, and others, might get some idea of how these societies are formed and managed.

"DUNDEE."

NEWS OF THE STAFF.

Mr. C. S. WOLSTENHOLME, District Manager, Canterbury, has been promoted to be Chief Engineer for the Liverpool district. Mr. Wolstenholme entered the Company's service in 1897. He became Local Manager at Leeds, and was transferred as District Manager to Canterbury in June, 1904.

Mr. C. T. ASHBY, Local Manager, Lincoln, has been appointed District Manager, Canterbury, in place of Mr. Wolstenholme. Mr. Ashby entered the service in Oct., 1892. He was appointed Local Manager at Bangor in January, 1899, and was transferred to Lincoln in the same capacity in January, 1902.

Mr. F. G. HIVES, Local Manager, Reading, has been appointed Local Manager at Dublin. Mr. Hives entered the service some twenty years ago. He was appointed Local Manager at Guildford in 1897, and at Reading in November, 1899.

Mr. D. B. FULTON, late Local Manager, Belfast, was presented with three bronze figures by the staff of the Ulster district on the occasion of his leaving to take up the position of District Manager at Gloucester.

Mr. C. H. SIBLEY, District Manager, Dublin, and his wife, we regret to state, are both seriously ill with double pneumonia. Mr. Sibley's condition has been very critical, but is improving.

Mr. ERNEST HANCHETT, the City Divisional Engineer's Chief Clerk, was married on June 2, the hearty good wishes of all who knew him accompany him in his new life.

Mr. P. T. WOOD, the Assistant Metropolitan Construction Electrician, was married on June 2, 1906, at St. Michael's-in-the-Hamlet Church, Liverpool, to Miss Lucy Florence Enright of Buenos Ayres. On the 14th he was presented with a handsome drawing-room clock by Mr. Clay, the Metropolitan Superintendent, on behalf of the Construction Department and a few other members of the London staff. Mr. Clay in making the presentation spoke a few well-chosen congratulatory words, to which the recipient suitably responded. Mr. Wood was also presented with a pair of *entree* dishes and a salad bowl by the members of the maintenance staff who were desirous of testifying in a practical manner their appreciation of the good feeling existing between Mr. Wood and themselves.

Mr. E. J. MORRELL, Assistant Engineer, Plymouth, has been appointed Local Engineer, Walthamstow. Before leaving Plymouth he was presented with a very handsome marble striking clock as a token of the respect and esteem of his colleagues, with whom he was most popular.

Mr. T. ELLEBY, Inspector, Truro, has been transferred to Cardiff to act in the same capacity there.

Mr. F. C. WALLAGE has been appointed Inspector at Truro.

Mr. STEVEN WOOD, has been promoted from Lineman Inspector, Stourport, to be Storekeeper at Birmingham.

Mr. D. MCKAY, of the Head Storekeeper's staff at Head Office, has been transferred to Birmingham as Chief Contract Clerk.

Mr. J. OGILVIE CAITHNESS, Contract Department, Dundee, was presented by the members of the staff with two cases of cutlery on the occasion of his marriage.

Mr. G. PRICE, Cardiff, has been appointed Chief Inspector at Pontypridd to fill the vacancy caused by the recent death of Mr. J. Jones.

Mr. F. W. SCEATS, of Gloucester, previously Wayleave Officer, has been made Assistant Engineer.

Mr. L. DAVIES, Inspector, Neath, has filled the vacancy for Inspector-in-Charge at Llanelly.

Mr. A. W. BRIDLE, Wayleave Officer, has been transferred from Guildford to Folkestone.

Mr. J. R. BLACK, late Clerk in the Guildford District Office, has been appointed Wayleave Officer in the Guildford Centre.

Mr. J. E. GREENWOOD, Inspector-in-Charge, Brighouse, on the occasion of his marriage was presented by the staff in the Huddersfield area with a handsome clock as a token of their good wishes.

Inspector S. B. TOWNSEND has been appointed Service Inspector, Sheffield, in place of M. Marsden transferred to Leicester.

Mr. ROBT. B. RAE, in charge of the Record Department of Glasgow District Office, has been promoted to the position of Engineer's Clerk in Edinburgh. Mr. Rae has had some twelve years' service, which have been spent in Aberdeen, Head Office, and Portsmouth, as well as in Glasgow.

Mr. JOHN HOOD, formerly of Stirling and Dumbarton, has been promoted in Mr. Rae's place, and Mr. JOHN H. H. BOYD, formerly of Hamilton, becomes Petty Cashier *vice* Mr. Hood.

Mr. WALTER B. FERGUSON resigned his position in Glasgow District Office on May 31 in order to proceed to Canada. He was presented by the Glasgow staff with a handsome gold albert and pendant, also with a kit bag

Mr. W. H. SHINN, Clerk in the Engineer's Office, Glasgow, left to take up a position in the Head Office Stores Department, on Tuesday June 5. On the preceding evening he was presented with a gold watch and pendant by his fellow employees, and carries with him their best wishes.

Mr. W. H. HOLMAN has been transferred from the Inspector's staff, Burton to Leicester.

Mr. W. HACKING, Inspectors' Department, Atherton, Lancashire, has been transferred to Burton.

Mr. F. J. SANDIFORD, Inspector at Canterbury, has been transferred to Ramsgate Centre.

Mr. A. E. SMITH, Inspector at Dover, has been appointed Chief Inspector at Margate Centre.

Mr. H. G. SMITH, Chief Inspector at Margate, has been transferred to Dover in a similar capacity.

Mr. A. SELL, Faultsman, Dover Centre, has been transferred to Ashford as Resident Inspector.

Mr. H. POOL, Inspector, Ramsgate Centre, has been appointed as Chief Inspector of Canterbury Centre.

Mr. W. C. FRAY, Assistant Engineer, Liverpool, left there on June 6, to take up an appointment on the Engineer-in-Chief's staff at London. He entered the service as a Draughtsman in 1892 and was appointed Assistant Engineer for the northern division of Liverpool in September, 1904. While in Liverpool he was responsible, under the District Engineer, for the working out of the details of the extensive underground system that exists in Liverpool at the present time. On his leaving he was presented by the district staff with a camera and stand, and by the local office staff with a fountain pen, slide rule, and umbrella.

Mr. L. A. MOSES, Cashier, Southampton, has resigned his position in the service to take up a partnership in London, in which all his friends in Southampton wish him every success. He has been with the Company for five years, and on the occasion of his leaving was presented with a handsome set of brushes by the district office staff.

Mr. E. J. RATHBONE, under whose supervision Edinburgh central switchboard was recently converted to common battery working, has been presented by a number of the staff in Edinburgh with a silver cigarette case.

Mr. S. R. MCKENNA, Instrument Fitter, Edinburgh, was on Friday, June 8, made the recipient of a gift of cutlery, from his friends in the district, on the occasion of his marriage.

Mr. S. WOOD, Lineman Inspector, Kidderminster, North Midland district, has been appointed Storekeeper at Birmingham.

Mr. W. H. COPE, Wolverhampton District Office, has been appointed Cashier, Birmingham District Office. Mr. A. W. Smith, District Manager, on behalf of the staff, presented Mr. Cope with a handsome marble clock on the occasion of this appointment and his approaching marriage.

Mr. D. COUPE, Instrument Inspector for the northern division, Liverpool, has resigned his position in the service in order to take up work in South Africa. He entered the service of the Company in the Isle of Man district on Nov. 25, 1898, and was transferred to the Liverpool district in November, 1902. Before leaving he was presented with a dressing case subscribed for by the members of the staff in the northern division of Liverpool.

London Traffic Department.—*Promotions during June*:

Miss F. CONWAY, Supervisor-in-Charge, Kingston, to be Senior Supervisor-in-Charge, Sydenham.

Miss T. TOWNSHEND, Operator-in-Charge, Molesey, to be Supervisor-in-Charge, Kingston.

Miss L. ARNOLD, Operator, Kingston, to be Operator-in-Charge, Molesey.

Miss L. DEANE, Operator, Kensington, to be Supervisor-in-Charge, Richmond.

Miss E. LEATHERDALE, Operator, Avenue, to be Supervisor, London Wall, Exchange.

Miss MCKENZIE, Operator, London Wall, to be Supervisor, Bank Exchange.

Miss A. MILES, Operator, Holborn, to be Supervisor, North Exchange.

Miss A. BEAN, Operator, Bank, to be Supervisor, Gerrard Exchange.

Miss K. HOWARD, Operator, Gerrard, to be Supervisor, Paddington Exchange.

Miss L. WHITELEY, Operator, Holborn, to be Supervisor, Hop Exchange.

Miss M. DEAKIN, Operator, Kensington, to be Supervisor, Gerrard Exchange.

Resignations of Operators to be married:

Miss M. A. HICKS, Supervisor, London Wall Exchange.
Miss A. CRONIN, Supervisor, Paddington Exchange.
Miss D. GODFREY, Supervisor-in-Charge, Richmond Exchange.
Miss L. KNOTT, Supervisor, Hop Exchange,
Miss S. SCHMERL, Supervisor, North Exchange.
Miss E. BLAKE, Operator, Walthamstow Exchange.
Miss H. FLOOD, Operator, London Wall Exchange.
Miss M. KEOHANE, Operator, Avenue Exchange.
Miss E. YOUNG, Operator, Avenue Exchange.
Miss B. KIMBEL, Operator, Avenue Exchange.
Miss A. RICHARDSON, Operator, North Exchange.
Miss J. ROPER, Operator, Battersea Exchange.
Miss M. HACKETT, Operator, Holborn Exchange.
Miss E. ROBBINS, Operator, Holborn Exchange.
Miss M. MARCHANT, Operator, Hop Exchange.

Presentations.—On leaving their respective positions as Senior Supervisors-in-Charge at Croydon and Sydenham, to be married as notified in last month's JOURNAL, Miss E. HOWARD was given a handsome set of silver-backed hair-brush, comb, and mirror, and in addition a Doulton's "Loving Cup," on which each operator inscribed her name, thus constituting an interesting *momento* of the staff with whom she had worked, and Miss F. HOWARD received a very pretty silver-mounted glass epergne.

Glasgow Operating Staff.—Miss MARY RAMSAY, one of the Senior Operators in Bridgeton Exchange left the service on May 31, and was married on June 27. The operators in her exchange presented her with a large oak tray with silver rail and handles and monogram and date on centre plate.

Miss M. MCFAULL, one of the Senior Operators in Royal Exchange left on May 24, and was married on June 5. The operators in her exchange presented her with a set of dish covers.

Miss C. MORRISON, one of the Senior Operators in Hillhead Exchange left on June 14, and was married on June 29. The operators in her exchange presented her with a dinner service.

Miss H. DICKSON, of Hillhead Exchange, left on June 7, and was married on June 15.

Miss E. A. TROTT, Monitor, Brighton, has been appointed Junior Supervisor, Brighton.

Miss A. TROTT, Senior Operator, Brighton, has been appointed Monitor, Brighton.

Miss M. J. HEAN, Supervisor, Bootle Exchange, Liverpool, who entered the service Nov. 2, 1894, has resigned to get married. Before leaving she was presented with a case of cutlery, subscribed for by the operators.

Miss M. MAWDSLEY, Senior Operator, Central Exchange, Liverpool, who entered the service May 10, 1897, has resigned to get married, and was presented by the operators with a tea service, silver sugar bowl, etc.

Miss F. M. HILL, formerly Operator at Maindee Exchange, Newport, resigned her position on May 31, after seven years' service, to be married. She carries with her the good wishes of the staff.

Miss WILLET, Senior Operator at Ayr, was presented with a gold bangle by Mr. G. A. McDONALD, the District Manager, on behalf of the staff, on the occasion of her leaving the service.

Miss G. E. NICKS, for some years Clerk-in-Charge, Exeter Exchange, resigned on April 2 and was married to Mr. G. S. Smale on April 18.

Mr. R. G. BALLE, Instrument Inspector, Exeter, was married on April 29 to Miss Russell, of Tiverton Exchange.

Miss R. CAMPBELL, Senior Operator, Exeter, has been promoted to Clerk-in-Charge.

Miss M. E. CARLINE, Senior Operator, Dundee, who entered the Company's service in 1890, has left to be married. Prior to her leaving she was made the recipient of a handsome electro-plate hot-water kettle and spirit lamp, as a token of esteem and good wishes from the staff.

Miss F. JOHNSON, Portsmouth Exchange, who entered the service on Dec. 11, 1903, has resigned to be married.

Miss L. THOMPSON, Senior Operator, Nottingham Central Exchange, has resigned to be married.

Miss G. A. BUGG, Chief Operator, Lincoln Exchange, has resigned to be married.

Miss CLARA REEVLEY, Operator, Birmingham, was married on June 2 to Mr. George Fielder. She was presented with a *jardiniere* by her fellow operators on the Birmingham and Jewellers Exchange.

Miss M. CUTTING and Miss L. M. HOWARD, Hull, have been promoted from the position of Supervisors to be Monitors.

Miss F. M. COWBURN and Miss F. HARTLEY, Senior Operators, Hull, have been made Supervisors.

Miss J. STARK, Chief Operator, Galashiels, was presented by the Border district staff with a handsome dressing case on the occasion of her leaving the service to go to Canada. Mr. H. G. Macfarlane, District Manager, made the presentation.

Inspector B. KNIGHT, of Tunbridge Wells, was promoted to Chatham Centre as second Inspector on Monday, May 14. He was the recipient of a dressing case from his fellow employees at Tunbridge Wells as a token of goodwill.

Sheffield Staff.—The following members are to be congratulated on passing the 1905-6 session examinations of the University of Sheffield Department of Applied Science:—E. S. Byng, telephony honours' grade, 1st class (prize), electrical engineering practical course, 2nd year, 1st class (prize), alternating currents, 2nd year, 1st class, magnetic circuits, 2nd year, 1st class, electrical circuits, 2nd year, 1st class (prize), electrical engineering tutorial, 2nd year, 1st class; A. Podmore, telephony honours' grade, 1st class, machine drawing, 2nd year, 1st class; R. Gillett, telephony honours' grade, 2nd class; H. Hemmington, telegraphy and telephony, ordinary grade, 2nd class; H. Roberts, telegraphy and telephony, ordinary grade, 2nd class.

Glasgow.—Particulars of the awards obtained by those members of the staff who attended classes at the Glasgow and West of Scotland Technical College during the past winter have just been announced. Mr. John P. Ross, Wages Clerk, secured 1st prize in the 1st course magnetism and electricity class; Mr. R. B. Rae, Record Clerk, secured 2nd prize, 1st course electrical engineering; Mr. Thomas Haveron, Exchange Inspector, secured 2nd prize, 1st course telegraphy and telephony; and Mr. Thomas Bell, Exchange Inspector secured 3rd prize, 2nd course telephony. In addition to these, 50 members of the staff secured merit certificates.

OBITUARY.

A. STAATS FORBES.—We regret very much to record the death on May 30 last of Mr. A. Staats Forbes, who for the past nine years was chief of the Conveyancing Department in the Solicitor's Office at Telephone House. He was the son of the late Mr. Alex. Forbes (late secretary to the Great Northern Railway Company) and was educated at Twyford, subsequently going to Oxford, where he took his degree and was admitted a solicitor in 1889. During the last two years he suffered from a painful illness, but there seemed good hopes of his recovery up to the end of May, when an operation became absolutely necessary, from the effects of which he never recovered. His loss is deeply felt by all his colleagues and by the members of the Solicitor's Office, as his charm of manner, ready wit, and kindliness of disposition made him a universal favourite.

WILLIAM COLLIER, Senior Pole Inspector, Engineer-in-Chief's staff, died on May 22, 1906, after an illness of a little over a month. During the whole of the time Mr. Collier had been in the Company's service, nearly seventeen years, he had not been absent from duty a single day through ill-health. His experience in the inspection of poles and other stores, was very extensive and his loss will be severely felt by the Company.

LOCAL TELEPHONE SOCIETIES.

London.—The London Telephone Society held the final meeting of the 1905-6 session on May 30 last, when interesting papers were read by Mr. J. R. Milne on "Power Plant C.B. Exchanges," and by Mr. Kidd on "Alternating Motors," to a fair attendance. An opinion was expressed that these papers were very valuable, and it was hoped that they might be printed in the JOURNAL as soon as the exigencies of space permitted. The committee recommended, subject to confirmation at the next general meeting, that the subscription should be reduced from 4s. to 2s. per annum, this to take effect from March quarter.

Plymouth.—A well-attended meeting was held at Plymouth on the 15th inst. to discuss the advisability of initiating a Telephone Society. After a lengthy discussion it was unanimously decided to form a society, the first meeting to be held in the first week of October when it is hoped that some interesting papers will be forthcoming and the society established as a success.

WHAT THE COMPANY IS DOING.

EIGHT exchanges were opened during the month of June bringing the total number up to 1,236. They were:—Egremont (Cumberland district), Hightown (Liverpool), Earls Barton (South Midland), Wantage, Wargrave, and Ashford (Middlesex) (Thames Valley), Laxey (Isle of Man), Dalry (Ayrshire).

The net increase in stations during May was 4,133, making a total at the end of that month of 382,010.

LONDON.—*Ritz Hotel, Piccadilly.*—A private branch exchange was opened at the above hotel on Monday, the 21st June, with 157 stations. The service is available day and night, Sundays included.

GLASGOW.—The Commissioners of the Burgh of Partick have just made arrangements through the Glasgow District Office for the erection of a telephone fire alarm system throughout the Burgh. Connections are to be made to twenty points, and the type of instrument to be used is that shown fitted to a post F.A. 40 in General Electric Fire Alarm Catalogue. The locking pull on this instrument enables any person unaccustomed to the telephone to signal the fire station. At the fire station, the lines will be connected to a switchboard from which lines will also run to police office, medical officer's department, etc.

NOTTINGHAM.—*Royal Agricultural Society Show.*—This show was held at Derby on the last four days in June. For the purposes of the stallholders, etc., the Company fitted a branch common battery exchange equipped for 40 subscribers and ten junctions. Service was given on both the local and trunk systems.

Underground Work, Nottingham Area.—The gangs are very busy on the Wollaton Road section of underground work. A two-mile length is being dealt with at the present time. Several other heavy extensions in this area have been sanctioned and it is hoped to start work upon them very shortly.

Mansfield.—The underground scheme in connection with this town has now been practically completed.

SOUTHAMPTON.—Several very extensive underground extensions in view, one involving the laying of a new submarine cable across the River Itchen. A new 1,000-line testboard is in progress and new power plant is under construction.

DUNDEE.—The Contract Department have just booked an order for six police and fire-alarm boxes (Glasgow pattern) to be fitted in different parts of the city.

EXETER.—The underground and general reconstruction work is now nearing completion. The installation of a power room is in hand.

NEWTON ABBOTT.—A general reconstruction of the plant is in hand.

GRIMSBY.—The installation of the new C.B. exchange for 700 lines has been commenced.

DUBLIN.—The extension of the switchboard by 600 lines has been placed on order.

HULL.—The work in connection with the extension of the C.B. switchboard by 2,160 lines has just been completed.

LONDON.—*Paddington.*—The installation of the new C.B. exchange for 5,540 lines has been commenced.

East Exchange.—The new C.B. exchange for 2,800 lines was brought into use on May 26.

BIRMINGHAM.—About $1\frac{1}{4}$ miles of trench and $8\frac{3}{4}$ miles of cable have been completed at Moseley. The Company has also taken possession of and is obtaining tenders for clearing the ground on its site for new premises in Hill Street.

TRIPS TO SHAKESPEARE'S COUNTRY.

In order to afford Shakespearian enthusiasts, and the public generally, facilities for visiting the beautiful and interesting country connected with the birth and life of the Immortal Bard, the London & North-Western Railway Company announce that again this year on every Wednesday and Saturday until further notice day excursions will be run from Euston to Stratford-on-Avon.

Tickets will also be issued enabling passengers to travel by rail to Kenilworth Station. Coach to Kenilworth Castle, Guy's Cliffe, Warwick Castle, Stratford-on-Avon, and back to Warwick; returning from Warwick Station to London by train. Time will be allowed for meals and visiting the various places of interest.

STAFF GATHERINGS.

Glasgow.—The annual picnic of the employees of the Glasgow district was held on Saturday, June 9. A company numbering about 250 journeyed by North British train and steamer to Dunoon on the Firth of Clyde, where under delightful weather conditions a most enjoyable afternoon and evening were spent.

Cardiff.—The district staff went by brake for their annual outing to St. Bride's, near Newport, on Saturday, May 26, unfortunately in rather inclement weather. An excellent tea was provided for the party, which numbered 50, following which some outdoor sports were indulged in, including a tug-of-war between the Cardiff and Newport staff. The latter being victorious brought home the shield, which has to be won three times (not necessarily in succession) before becoming the property of either team. A short smoking concert then followed and the party left for home at nine o'clock.

Belfast.—A very successful outing to Crawfordsburn, promoted by the local Telephone Society, took place on Saturday the 16th inst. Unfortunately the weather was not all that could be desired, but after tea a most enjoyable evening was spent, singing and dancing being kept up until nine o'clock under the chairmanship of Mr. Gilmour, the District Manager.

Barrow-in-Furness.—The staff held their first annual outing on Saturday, June 16, visiting Newby Bridge and Lake Windermere. Lakeside New Hotel was reached at 4.30, where full duty was done to the repast which had been prepared. Leaving the hotel, the party took advantage of the boating facilities on the lake, and of the opportunity to visit its surroundings. Returning from Lakeside at 8.15, the journey home was completed under pleasant conditions.

Brighton.—The National Telephone Company Cricket Club played a match with the Brighton & Hove Gasworks Club on the Racecourse on Saturday, June 16, the result being a win for the Telephone Club by 107 runs to 23. At a meeting of the club committee held on the 15th, the following officers were elected:—F. H. Johnson, captain; D. Gunn, vice-captain; and E. A. Garrett, secretary and treasurer.

The Brighton staff propose journeying to Washington on Saturday, July 21, for their annual outing. There will be a very large party, and should any old members of the Brighton staff be in the neighbourhood at that time and would like to accompany them their presence would be welcomed. Mr. H. LEGGE, Engineer, is acting as secretary.

Border District.—Playing in the annual competition in connection with the Factory Challenge Cup the members of the Company's staff in Galashiels played their first tie on June 6, when they beat Messrs. Ovens & Shaw by 10 runs. Scores:—Company 66 (T. Elliot 36), Ovens & Shaw 56. Bowling for the Company, C. Anderson took 4 wickets for 14 runs.

Preston.—The operating staff, with a few friends, had a very enjoyable outing to Whalley on the 9th inst. The arrangements were ably carried out by Misses Chadderton, Woodward and Moorhouse.

Reading.—A tennis club has been formed among the staff at Reading, and the courts were opened for play on June 13. The subscription is 5*s.* male members, 2*s.* 6*d.* lady members.

THE NATIONAL TELEPHONE OPERATORS' PROVIDENT SOCIETY, LONDON.

A MEETING of representatives from the London exchanges, presided over by Mr. W. B. Benham (Avenue), was held at Marshalsea Road, on June 9, to form a society having for its purpose the payment of a certain sum of money for a period during absence in case of sickness among the members of the London Traffic staff.

After a discussion as to the objects of the society, a resolution was passed and carried unanimously that such a society should be formed on the lines suggested, and a provisional committee was arranged with Mr. C. W. Piggott as secretary *pro tem.* for the purpose of drafting the necessary rules for a general meeting.

The general meeting was subsequently held at 58-9, London Wall, on Monday, the 18th inst., under the chairmanship of Mr. H. G. Corner.

The meeting, lasting over two hours, was well attended and resulted in much business being accomplished. The draft of the rules having been read, was discussed and fully commented upon, and subject to certain alterations being made, was carried. Among those taking part in the discussion were Miss Ralph, Miss Maidwell, Miss F. Charman, Mr. W. B. Benham, Mr. C. W. Piggott, Mr. P. Mantle. The following officers were then duly elected:—Mr. J. F. Edmonds as president, Messrs. W. B. Benham and C. W. Piggott as vice-presidents, Mr. H. G. Corner and Mr. H. Deane as trustees, Mr. C. F. Arrowsmith as treasurer, and Miss E. Nicholls as secretary. A committee of 25 were elected consisting of seventeen lady members (one from each exchange district and three from the operating school), five night operators and three exchange managers, many of the members of the committee agreeing to act as collectors.

The objects of the society are to pay the sum of 5*s.* per week for a period of thirteen weeks in case of sickness, after three days' absence.

A levy of 6*d.* per member is proposed to be collected in the event of the death of a free member. Members are to be eligible for sick pay after being members for four weeks. The entrance fee is 3*d.* with a contribution of 3*d.* a week, the surplus funds being shared out at the end of the financial year according to length of membership. Members can be taken at any time; over 400 members of the Traffic staff have intimated their intention of joining.

Further particulars can be obtained from any collector, member of committee, or from the secretary, Miss E. Nicholls, 9, Marshalsea Road, Borough, E.C.

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TELEPHONE MEN.

III.—ROBERT HEYWOOD CLAXTON.

MR. CLAXTON was born in Bedford Street, Liverpool, on April 20, 1840, and is the third son (eldest surviving) of the late WILLIAM CLAXTON, of the firm of Sanders & Claxton, corn merchants, of Liverpool. His first school was in the Isle of Man, and afterwards he finished his education at the Rev. A. RAMSEY'S school at West Derby, near Liverpool.

After leaving school he entered the office of James Fletcher & Co., Liverpool, South American merchants, with whom he remained some years. In 1866 he married the youngest daughter of the late THOMAS JOHNSON, J.P., architect, of Lichfield. On leaving James Fletcher & Co., Mr. CLAXTON went to London and thence to Buenos Ayres, where he was in the service of the London & River Plate Bank for nearly ten years. It was during his sojourn in Buenos Ayres, in 1871, that the terrible epidemic of yellow fever occurred, when all the business houses were closed for some weeks by order of the Government, the banks only being open for an hour daily. Although some two-thirds of the inhabitants fled from the city, Mr. CLAXTON remained at his post and went to the bank daily, until he was himself stricken with the fever.

In 1878 Mr. CLAXTON returned to Liverpool, and on Sept. 5, 1879, he first started in telephone work. At this time there was no central office, nor had any lines been run, with the exception of one between two private offices as an experiment. Mr. CLAXTON was, therefore, in many ways, one of the pioneers of the telephone industry in this country and he has been actively engaged in telephone work for nearly 27 years, a period covering practically the whole history of the telephone in the United Kingdom. From 1879 to 1893 Mr. CLAXTON was Manager for the Liverpool district, which included Liverpool and suburbs, Birkenhead and suburbs, St. Helens, Wigan, Warrington, Runcorn, Widnes, Southport, Chester, Llandudno, Bangor, Wrexham, Ruabon, Northwich, and the Isle of Man. The difficulty in making a start in Liverpool was very great, as at that time the public had had no experience in the use of the telephone and little belief in it. In order to get the business under way, Mr. CLAXTON obtained promises in writing from various firms that provided 300 subscribers could be obtained by January, 1880, they would join for one year at least and pay £20 a year for the service.

Soon after starting, a company was formed under the title of the "Lancashire Telephonic Exchange, Limited," under license from the United Telephone Company of London, the owners of the master patents; later on this company was taken over by the "Lancashire & Cheshire Telephonic Exchange Company, Limited."

In 1880 the Edison Telephone Company was taken over, and in 1881 the telephone business of Messrs. DAVID MOSELEY & SONS, of Manchester, was bought.

In the early days No. 11 iron wire was used for the line circuits, which were run single, and in Liverpool the Blake transmitter with single pole Bell receiver and a special type of battery switchbell, known as the "Liverpool" pattern, were used. A number of circuits were run by the Railway Company along the railway between Manchester and Liverpool, which were rented as private wires to firms having offices in Manchester and Liverpool. These circuits were afterwards purchased by the Post Office, owing to their being on railway property. Before 1885 trunk wires were erected by the Post Office for the Company, the latter guaranteeing a certain revenue per annum in respect of each circuit, any profit to be divided equally between the Post Office and the Company. The number of yearly renters to each circuit was limited. The charge was £30 per annum, each end, for the joint use of one of the Manchester-Liverpool trunk lines, when available. In 1885, under the terms of the new Post Office license, the Company erected its own trunk lines, connecting some 21 towns in Lancashire and Cheshire. Copper

wire was used on these lines. The tariff to subscribers for unlimited use of a trunk line was 10s. per annum per mile (single circuit) for each end of the line, with a minimum annual charge at each end of £5. Later on communication was established with London. To advertise the trunk service, music from the London theatres was often transmitted to Liverpool, a performance much appreciated by subscribers. Public call offices were opened in January, 1885, the charges being 3*d*. per call to subscribers for local calls, and the trunk toll rate to subscribers from their offices or to anyone at a call office was 6*d*. per message of three minutes. Subscribers paying less than a local rate of £12 per annum were not allowed to use the trunk wires from their own offices. Special rates were allowed the Press between certain hours.

Up to 1884 the Bell "slipper" switchboards, with loose separate cords for connecting, were used in Liverpool, but in 1884 the multiple pattern switchboard was brought into use. Liverpool was the first town in Europe to adopt the multiple switchboard, and gave its name to a well-known pattern of spring jack, long known as the "Liverpool" jack.

In April, 1886, a fire broke out in the Liverpool testroom, beneath the switchroom, and the flames spread through the casing carrying the line cables, entirely destroying two 200-line switchboard sections as well as cutting off the whole of the subscribers' lines.

Fortunately, however, two new 200-line sections had been fitted a short while previously, and the interruption of service did not extend beyond five days, including the intervening Sunday.

Early in 1885, on the opening of the Mersey Tunnel, Birkenhead was connected with Liverpool by means of an anti-induction lead-covered cable containing single wires covered with cotton saturated with resin and oil, three of the wires being connected to earth at each end as a means of lessening the induction. In 1891 this was replaced by two 41-pair Western Electric dry-core paper cable—the first dry-core cable used in the United Kingdom.

The Mutual Telephone Company, Limited, started business in Manchester in 1890, but they made no headway in Liverpool, so the project of starting a competitive exchange in the latter town was abandoned.

In 1889 the Lancashire & Cheshire Telephone Company amalgamated with the National Telephone Company, and in 1893 Mr. CLAXTON was appointed Superintendent of the North-Western Province, which at that time took in Cumberland, Westmoreland, Lancashire, Cheshire, North Wales, and Shropshire, as far as Shrewsbury. Later on the area was somewhat altered. On May 1, 1905, Mr. CLAXTON retired from the position of Provincial Superintendent, and was made a member of the Lancashire & Cheshire Local Board of the National Telephone Company, thus remaining in touch with the great industry in which he has been such a leading spirit since its birth.

Mr. CLAXTON was the first to employ female exchange operators, starting them first in Liverpool and later on in London at the Westminster Exchange.

At the time of his retirement he had under his management a staff of about 2,500, some 58,000 telephones, and 150 exchanges, about 110 of which had been opened under his supervision.

Mr. CLAXTON has been an Associate of the Institution of Electrical Engineers since 1883. He was one of the early Volunteers, joining prior to 1860, but he resigned the Lieutenancy of the 8th L.A.V. on leaving Liverpool.

THE EARTHQUAKE AT SWANSEA.

BY ALFRED COOMBES.

AT 9.43 a.m., June 27, a severe earthquake shock passed over the Swansea area. The effect was felt very badly at the Swansea Exchange, where one side of the switchboard canted from the perpendicular, and several operators were thrown from their positions. Every indicator was down. Fortunately there was no panic, and within ten seconds all positions were again occupied and work proceeding satisfactorily, but from 9.45 to 11.15 a.m. the traffic dealt with was enormous; on several occasions the cord capacity at certain sections was inadequate to cope with the calls through every cord being in use, while dozens of subscribers were waiting replies from the exchange. At the party-line section batches of a hundred indicators would drop simultaneously, some being false calls, but all requiring attention as it was impossible to distinguish false from real.

Enquiries were numberless and were dealt with by the exchange officials as expeditiously as possible. Supervision was increased and everything possible done to meet the extraordinary circumstances, so that by about midday matters began to resume their normal course.

It was estimated that the traffic from 10 a.m. to 12 noon exceeded the previous highest busy hour five times.

All outlying exchanges were immediately tested and a reply obtained from each, though the operators were all working under extreme pressure.

No material damage was done to the building or to the exchange equipment.

The usual quarterly peg count was being taken, but this had to be abandoned immediately.

A word of praise is due to the operating staff for the excellent manner in which they rose to the occasion and assisted the Company's officials to tide over a period of considerable stress.

QUICK COMPLETION OF NEW ORDERS.

BY R. STIRLING, *Portsmouth*.

ONE of the greatest Englishmen whom the sixteenth century produced wrote: "True dispatch is a rich thing. For time is the measure of business, as money is of wares, and business is bought at a dear hand where there is small dispatch. . . . When things are once come to the execution there is nothing comparable to celerity."

Amongst all the varied and pressing telephone questions—engineering, electrical, executive—constantly clamouring for settlement, this one of the necessity for achieving the prompt completion of new orders is not the least worthy of a little thought and attention.

BACON'S maxims, quoted above, suggest two reasons: (1) The indirect gain to business in general; (2) the direct gain in revenue.

A good reputation is a splendid asset. Unfortunately, in many circles ours is not of the best, and we have, therefore, not only to make a new and clean one, but, in many cases, retrieve an undeservedly bad one. Promptitude in carrying out work entrusted to us is one of the best methods; and this, added to *good* work, will be most effective in gaining the trust and confidence of the public.

In Portsmouth we have been trying recently to improve matters in this respect. The result is illustrated by a letter from an importunate subscriber. He had signed his order on Wednesday; on Thursday morning he wrote: "No sign of the telephone yet; we are in need of it hourly." Factiousness or "cussedness" may have been responsible. I prefer to think that the correspondent, knowing of our usual energy, was surprised that he was not on the exchange within 24 hours. We did it within 72, with a holiday in between.

Orders beget orders. Each new subscriber connected means a potential gain of several others. Friends and clients want speedy communication with him and he with them. The more quickly we can execute his order the sooner and the more readily will he become an advertising medium for our business.

Good humour is a quality worth cultivating, both in oneself and others. Don't let an intending subscriber lose his temper through delay in carrying out a contract. Having been badgered, cajoled, persuaded, or—best of all—*convinced* into signing an agreement, nothing will create a worse impression than dilatoriness in fulfilling that agreement. Many lines have been lost because the subscriber had changed his mind by the time we were ready.

As a business concern we exist on our revenue. Each order represents a revenue-earning capacity from the date on which it is signed. Further, a considerable proportion of our capital has necessarily been expended on spare plant of all kinds. That capital only becomes productive from the date on which the spare wire is converted into the working wire; but the plant begins to

depreciate from the date of erection, and, therefore, the longer we delay in connecting up our subscribers the less value do we obtain from the provision made.

In my district we were in June connecting up new orders at an average of 14·8 days each, including several delayed considerably for railway, council, and Admiralty wayleaves. The average over the country is no doubt higher, as we are working at competitive pressure. Classifying our outstanding orders and giving them a value approximating to the Company's average tariff throughout England, I find that the revenue per order may be fairly gauged as £5 16*s.* per annum = 4*s.* 5½*d.* per fourteen days. This means that on an average completion-time of fourteen days per order, the Company loses, for each 100 new orders, £22 5*s.* 10*d.* of revenue, which would have accrued could the order have been completed on the date received.

For the past twelve months 50,000 is a reasonable approximation of the number of new orders obtained throughout the country, and their total revenue value during the period taken to complete is £11,145 16*s.* 8*d.* Some alert critic will, of course, remark: "The figures are taken from the date of the order, and you cannot possibly complete your new lines on the day ordered." I should not care to champion a one-day average, but my point is that for every day beyond an average of fourteen taken to complete the Works Order, the loss is correspondingly greater than the large sum mentioned above, and for every day by which we can reduce the average the Company are the gainers. If the figure can be got down to seven, the Company will gain to the extent of over £5,500 per annum. Our plant, our staff, our organisation should be such as to get even better results than that, if possible. It means money.

Statistics are sometimes a trifle wearisome, and I will therefore not quote many. I may say, however, that recently in the Portsmouth area, thanks to loyal and intelligent co-operation of the staff, we have in a period of three months reduced our outstanding orders by 57 per cent. Our wayleave troubles are as bad as any and worse than in most parts of the country, and an aerial cable reconstruction scheme is still incomplete, so that the result has been attained against some odds. By and by we hope to improve on this figure; we aim for the present at having not more than a week's orders on hand at any time.

One or two points which have arisen during an investigation into this subject may be of general interest:

(*a*) Harmonious and systematic working between engineering and electrical departments. The latter should know each morning which lines are likely to be finished that day. Each evening the engineer should furnish a list of lines completed during the day, so that where instruments have not been fixed, the fitter may be despatched promptly in the morning. A hiatus between completion of the outside work and fixing the instrument means loss of revenue to the Company and irritation to the subscriber.

(*b*) Prompt advice of new orders from contract to engineering department. Entering up on records, making out Works Orders, etc., take up time. It was found that an order handed in by a canvasser towards 6 p.m. generally reached the engineer about 24 hours later. This meant a clear loss of one day. A day saved is a day's revenue gained, so now the contract agent sends to the engineer each night a list of all contracts brought in by canvassers up to 6 p.m. The assistant engineers on the following morning can then allocate the work to gangs in the vicinity, and find out what wayleaves are required.

(*c*) Wayleave difficulties should not be left to settle themselves. At the end of March 38 per cent. of our orders were waiting for bracket and pole permissions; at the end of June only 13 per cent. were being delayed for this cause. The decrease I attribute to increased vigilance on the part of engineers and wayleave officers, and a better appreciation of their responsibility. Inquiries into individual cases have proved to me that a little more pertinacity and ingenuity were sufficient to solve some wayleave problems which had been practically shelved.

(*d*) Personal interest in and examination of the Works Orders by the engineer. This will stimulate his staff to keep this branch of their work up to a high level. The personal element plays a greater part in attaining success than we are often inclined to admit. Efficient machinery and organisation are essential, but to aid them we require the "dynamic force" of personality.

Some of these remarks are perhaps rather elementary, but my excuse must be that frequently it is the obvious that escapes us, and the very ordinary that requires emphasis.

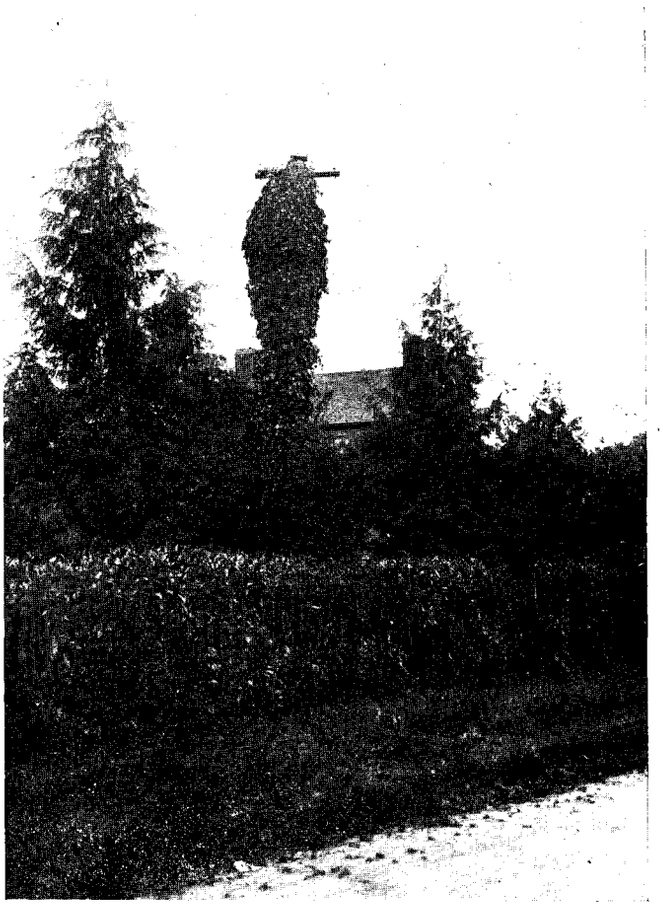
It has been said of ABRAHAM LINCOLN as President: "At first he was so slow that he tired out all those who see no evidence of progress but in blowing up the engine; then he was so fast that he took the breath away from those who think there is no getting on safely while there is a spark of fire under the boilers." In telephone work we should, by now, have got over the "slow" period.

WANTED: A "ROUTE" TO MATCH ITS SURROUNDINGS.

BY A. D. PIKE, *Cheltenham.*

I HAVE been greatly interested in Mr. BEST'S able article in the June JOURNAL and cordially agree with his remarks. I have had some experience of the fads and fancies of the inhabitants of a residential town.

With the view of carrying the idea a step further towards a possible solution, I submit the accompanying photo. Why not have the poles and arms artistically treated to harmonise with the surroundings? The pole illustrated is *not* one of the Company's, but the design is not copyright and is offered for what it is worth.



From an æsthetic point of view, certainly this pole, fitted with dark green insulators, would be ideal; though it is possible that extremely practical individuals (Mr. SHEA for instance) would reject it as "electrically unfit." Then again, the substitution of ivy tendrils for pole steps, and possibly for the earth wire, and the consequent saving would be a great recommendation in the eyes of economical district managers.

Against this saving such little inconveniences as having to send a man back to the stores to change a sage-green insulator for a dark green one, or to match an insulator with a particular leaf to suit the taste of a fastidious wayleave granter, would be trifling.

A PLEA TO OPERATORS.

By EMILY E. NICHOLS, *Hop Exchange.*

TELEPHONES and exchanges!—both, as everyone knows, very essential to each other, but wherein lies their value apart from that one connecting link—the operator?

None will dispute the important part played by the telephone operator, so it might be advantageous to look for a short time at what the aim of those upon whom the result of the whole service so much depends should be.

At the present time, when efforts in every direction are being made by the Company to better the conditions of the service and to facilitate the operators' work, surely a great effort should be made by the operators themselves to render not merely an efficient, but a record service.

Is there any reason, I ask, why England, a country so far advanced in commercial enterprise, should be behind any other country in the matter of telephone service? The practical answer to this question, I feel sure, lies very largely in the hands of our operators. I do not hesitate to say that if the telephone is to become that boon and blessing to all mankind that it is intended to be, it must be the aim of every operator individually, and of the whole operating staff collectively, to instil in each subscriber such implicit confidence in those upon whom he depends for his telephone service, that in any time of need or doubt he can safely fly to his telephone, assured that if help can come from that source it will be promptly forthcoming.

We frequently hear of that soft answer that turneth away wrath. On the other hand, it is just as much a certainty that the sharp, irritable answer of an operator who is inclined to retaliate when a subscriber waxes wrath will provoke him to greater wrath and probably bring down upon the head of the Company much unnecessary abuse.

Having attended the reading of Mr. CORNER's paper on "The Elements of a Good Service," I dreamt a dream which may perhaps serve to illustrate my meaning. Though not anticipating that state alluded to by Miss MINTER in her article of last month, I was decidedly troubled about the cookery question, endeavouring to set out on a blackboard before a large audience a recipe for a "Telephone Essence," the ingredients for which were half an ounce of patience and half an ounce of civility. Absurd as this may look, to my mind there is much in it, for these two things combined give the essence of telephone operating and will go a long way towards satisfying subscribers.

A quick service is always to be desired, and should always be aimed at; but a quick answer, unless accompanied by a civil and courteous tone and an equally quick and sure connection will be practically valueless in attaining the desired results.

We should do well to cultivate between exchanges, and also between teams in exchanges, that healthy sign—a spirit of rivalry. Now that systematic service testing is taking a prominent place, we are enabled to see how we stand with regard to other exchanges, and this should incite all to strive hard for the place of honour.

"Many hands make light work." With the united efforts of all concerned the task before us should become comparatively easy.

DRAWING OUT AND REPLACING CABLE.

By ALFRED PERKINS, *District Manager.*

IN Bristol we carried out some work of this kind in June last, in which, notwithstanding the fact that the final result was satisfactory, certain troubles occurred. I think a record of these troubles will be most useful to those who have not had any experience in this class of work.

We had five lengths of 102-pair cable to draw out, 130, 160, 147, 110, and 120 yards respectively—four of these had been in from eight to nine years, and were part of the same cable. The fifth, also 102-pair, had been in about two years, and was about half mile further along on the same route.

All the 100 subscribers had of course been previously advised that their service would be interrupted between two o'clock on Saturday afternoon and six o'clock on Monday morning.

The cables had also been tapped and labelled; this was done by means of paper sleeves, which had been marked with their proper numbers in ink before being sent out for use.

At three o'clock the signal was given to cut the cables. The ends were sealed by wiping and the woven cable clips were put on, and an attempt was made to draw out by hand a length of 130 yards, but the men could not move it. The winch was then applied, with the result that the end was immediately pulled off the cable. The cable was re-wiped and another attempt made, with a similar result.

I then gave instructions for the cable to be cut about the middle, as at this point there was a split pipe at the side of the bridge. An attempt was then made to draw out half the original length by hand, with the result that the end was pulled off twice without moving the cable in the slightest.

I then had the cable cut at the other side of the bridge, about fifteen yards from the end. After two attempts this short piece was drawn out, and it was found that the grease had set nearly as hard as cement and had been holding the cable.

The other two lengths of this cable were then drawn out without any trouble.

A similar result occurred with the other three lengths. In two cases we had to break the pipes back some considerable distance before we could move the cables. In each case it was found that it was the grease which was holding them, and it was always at the end from which they had been paid in. This would point to the fact that it is not desirable to put on too much grease for the last 25 yards of cable.

With regard to the fifth length, which had only been in two years, no trouble whatever was experienced with this. It came out immediately.

The whole of the five cables were drawn out and the new 250-pair cable drawn in before eight o'clock in the evening, and the jointers were at work making the intermediate joints.

Everything was through and working before six o'clock on Monday morning, and the intermediate joints entirely completed.

I had a similar experience about three weeks ago in drawing out a 90-yard length of 52-pair cable which had been in nearly nine years.

Four years ago I drew out some five lengths of cable here and had no trouble whatever, the grease being as soft as the day it had been put in. It would therefore appear that after a period of seven or eight years the grease sets. I do not know whether we are now using a different kind, but if not, something I think should be done in this direction.

I have not yet been able to get out the cost of the work, but hope very soon to do so.

WORKING DIRECT FROM THE GENERATOR.

By THOMAS PETTIGREW.

RECENTLY we had a slight breakdown in our main battery at the Royal Exchange (Glasgow) and advantage was taken of the opportunity thus presented to see whether it was practicable to run the exchange direct off the machines.

From tests made of the characteristics of the dynamos some three years ago, this seemed perfectly feasible. When put on to the load direct the machines took up the work without difficulty, and no one outside of the power room was aware that any change had been made. We ran thus for four days, a light emergency battery taking the load at night. The emergency battery was so arranged that should anything have gone wrong with the machines the battery would have taken the load automatically.

It is necessary, of course, when running direct, to have a man standing by to attend to the voltage, regulating the field excitation when necessary, but it is very important to know that running direct is quite feasible, as in an emergency the machines could do the work of the battery without causing any difficulty. Glasgow, however, is not common battery talking.

STUDY OF TELEPHONIC SPEECH TRANSMISSION.

BY B. S. COHEN.

(*Continued from page 49.*)

THE instruments so far described, with the addition of a sensitive electrostatic voltmeter, are all used for measurement and investigation of telephone speech waves. It may now be of interest to describe the telephone standards that have been adopted.

Fig. 11 shows one of the standard telephone instruments in its case. It is of the familiar central battery pedestal pattern, and is one of those tested and certified jointly by the General Post Office and ourselves.

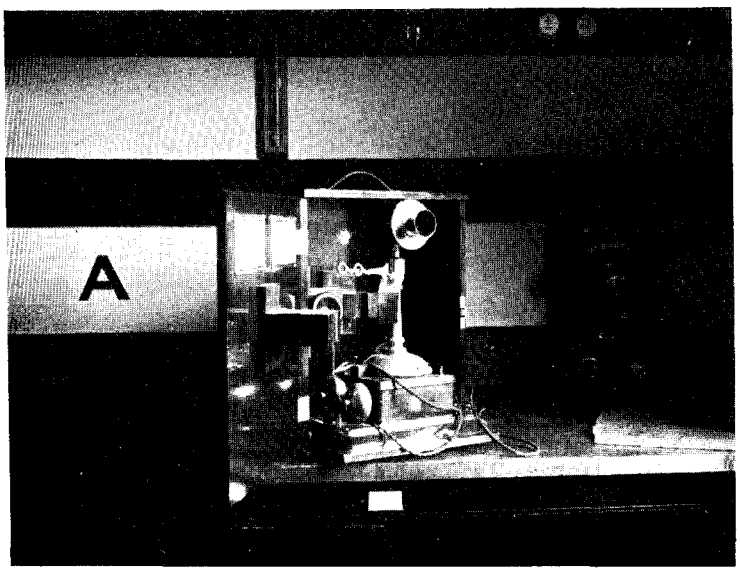


FIG. 11.

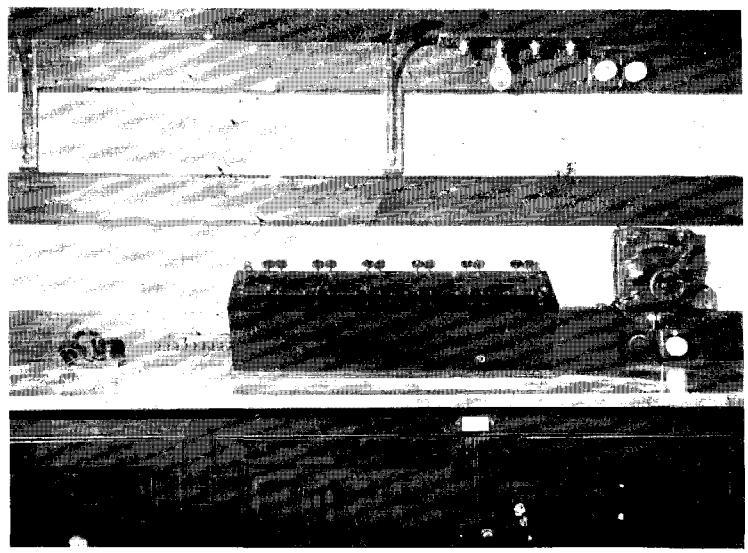


FIG. 12.

Now, turning to standard lines. At Head Office two cables have been installed for experimental purposes, one of these is a 612 pair cable, and gives 32 miles of 9½-lb. circuit by ·1 mile intervals.

The other cable is 204 pair, and gives 51 miles of 20-lb. circuit, also by ·1 mile intervals.

These cables are potheaded in the laboratory, and very short silk and cotton-covered leads take the ends on to devices by which, firstly, one mile intervals in the case of the 20-lb. cable and ·5 mile intervals in the case of the 9·5-lb. cable can be isolated, and secondly, any length of line can be inserted in circuit by depressing a key.

The 20-lb. cable is practically the test cable referred to in the agreement, and has an equivalent therefore of approximately 1. The 9½-lb. has an equivalent of ·62.

In addition to these cables we have two portable artificial cables, and these are very useful to take about the country.

Fig. 12 shows one of these cables complete. It is made up like a resistance box, and is equivalent to 35 miles of standard cable. It consists of a combination of non-inductive resistance coils and condensers.

Having now described the standard instruments and lines, all that is left is the standard circuit.

Fig. 13 shows this circuit. This is the circuit which would be used when two central battery subscribers were talking over the trunks.

Fig. 14 shows the circuit set up in a box which is arranged for comparison purposes.

The repeaters, relays, and resistance coils are mounted inside. Suppose it is required to obtain the equivalent of a certain line. By arranging the double-ended plugs, and connecting the line under test and a standard line for comparison purposes, to the various terminals, we can, by throwing a key from side to side, insert either line into circuit, and by varying the length of standard cable until a balance is obtained, we can at once obtain the equivalent. It is with the standards described, that the equivalents and tables issued in circular letters, &c., have been arrived at.

A few reproductions of photographs of telephone waves obtained with the oscillograph may be of interest. The vowels *a*, *e*, *i*, *o*, *u* are shown in Fig. 15. It must be pointed out that as the falling photographic plates only record for about $\frac{1}{25}$th of a second time, that it is difficult to get the beginning and end of any sound, so that continuous or rapidly repeated sounds are the best to record photographically with falling plates.

Fig. 16 shows the numbers 1 to 5 repeated rapidly. The

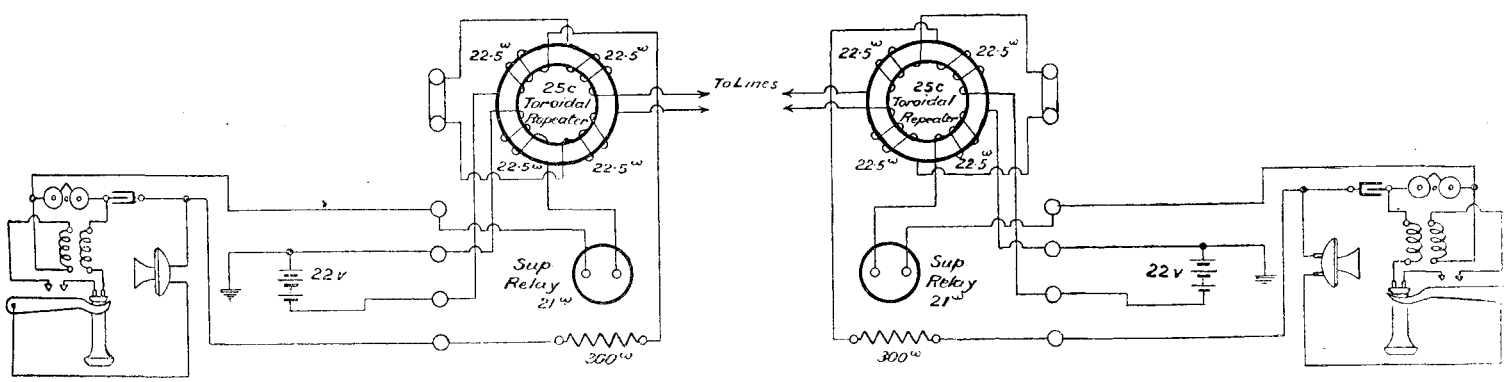


FIG. 13.

relatively big amplitudes of 4 and 5 are very noticeable. It is interesting to note that long before these photographs were made, the relative loudness with which the number 4 came out in the receiver when counting 1, 2, 3, 4, 5, had been observed.

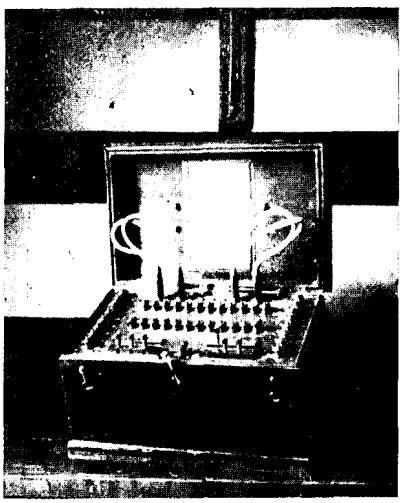


FIG. 14.

Fig. 17 shows that the oscillograph can be used to study the attenuation and distortion of telephone waves.

One of the vibrating strips is placed at the beginning and the other at the end of a 20-lb. cable line, 17·6 miles long.

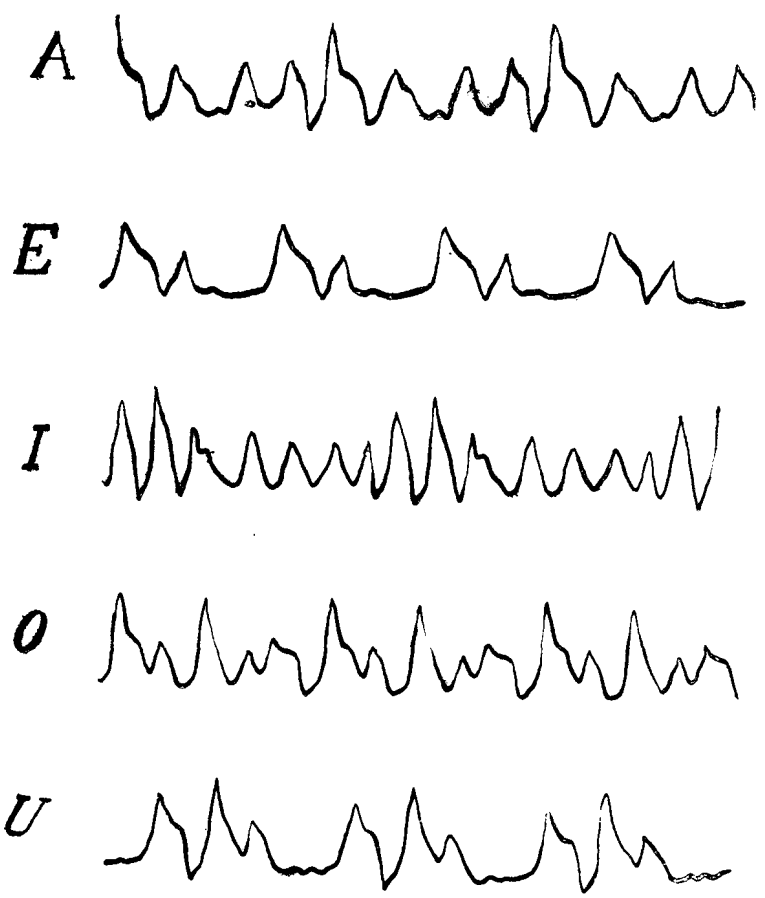


FIG. 15.

The figures show the actual attenuation and distortion of part of the word "Hullo," which was rapidly repeated.

The respective R.M.S. values of the amplitudes gives a measure of the attenuation.

The distorting action of the line is well seen in the rounding off of the sharper peaks.

Lastly, Fig. 18 shows the waves produced by a humming telephone, both in the receiver and transmitter circuits.

The humming was produced in the familiar manner by short circuiting the terminals of an ordinary local battery instrument, and placing the receiver earpiece close to the transmitter mouthpiece The wave is very regular and approximately sinusoidal in form.

The above photographs have been picked out from a large number, as being of the most general interest, and as serving to show the possibilities of this beautiful instrument.

Use of Iron Wire for Telephonic Purposes.—It is quite possible to use iron wire for telephonic transmission purposes, and it is conceivable that under certain conditions it would pay to do so. A few figures may be of interest:

400-LB. IRON WIRE: VALUES OF ELECTRICAL CONSTANTS.

With steady Current.	*With 750 ~ alternating Current.*
24 ohms per mile, resistance.	49 ohms. per mile.
·019 henry „ inductance.	·0034 henry „

$$\text{Equivalent} = \frac{\cdot 103}{\cdot 0203} = 5.$$

So that a 400-lb. iron wire has about the same transmission efficiency as a wire between a 70-lb. bronze and a 100-lb. copper.

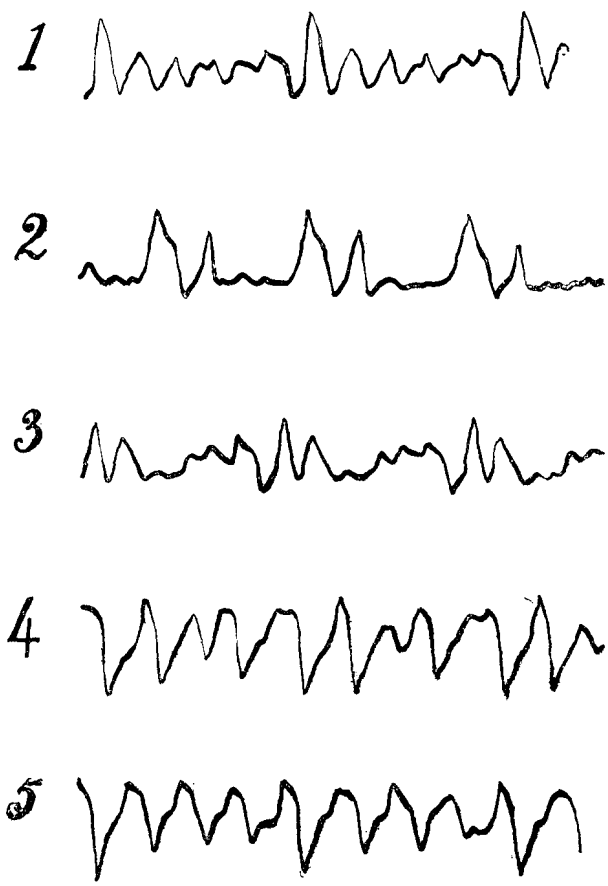


FIG. 16.

Complications caused by Terminal Reflection.—Fig. 19 will serve to illustrate the complexity of the phenomena which takes place in the telephone circuit. This shows the relationship between the transmitted and received current over varying mileages of 20-lb. cable connected in a standard circuit. It will be seen that up to about eleven miles the received current is actually greater than the transmitted, and thus it is only after this distance has been exceeded that the currents follow the ordinary attenuation laws. This, of course, does not mean that the power at the receiving end was necessarily greater than at the transmitting end, as a considerable difference in phase between the current and pressure may exist at the receiving end. These figures were obtained by means of the thermo-galvanometer, and similar results have been obtained with the oscillograph.

This peculiar effect is due to the reflected waves from the receiving instrument interfering to some extent with the direct waves. This interference gradually decreasing as the distance from the receiving instrument decreases.

It is interesting to note that curves drawn by Mr. G. M. SHEPHERD from calculations he has made, allowing for the impedance of the terminal instruments, are practically identical with Fig. 19.

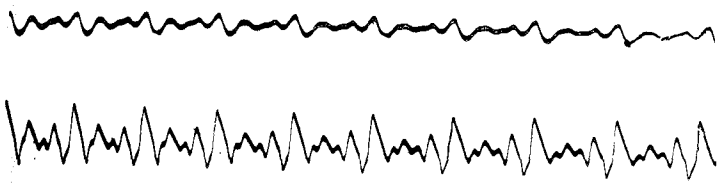


FIG. 17.

Lines in Parallel.—The attenuation of a number of cable lines in parallel should be the same as for a single line, provided that nothing need be considered but the ordinary attenuation laws, for as each line is added in parallel, K increases and R decreases by a proportionate amount. By actual test, however, it is found that two lines in parallel are actually worse than one line. For example, two 12 m. lengths of 20-lb. cable in parallel showed 27 per cent.

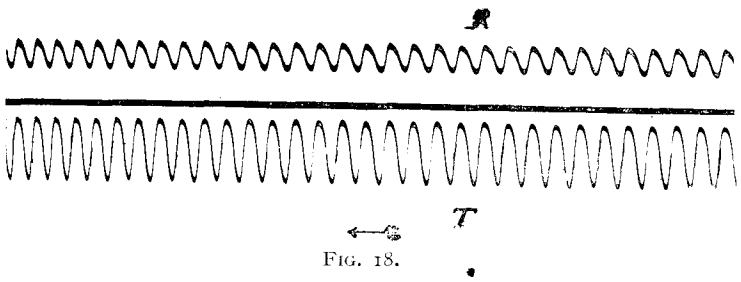


FIG. 18.

more attenuation than a single line, and 4 — 12 m. lengths in parallel showed 55 per cent. more attenuation than a single one.

This is due to the fact that the impedance of two lines in parallel is half that of one line, and, consequently, a greater load is placed on the transmitting induction coil or translator, which causes a drop in the P.D., and thus an actual reduction in the current received by the instrument.

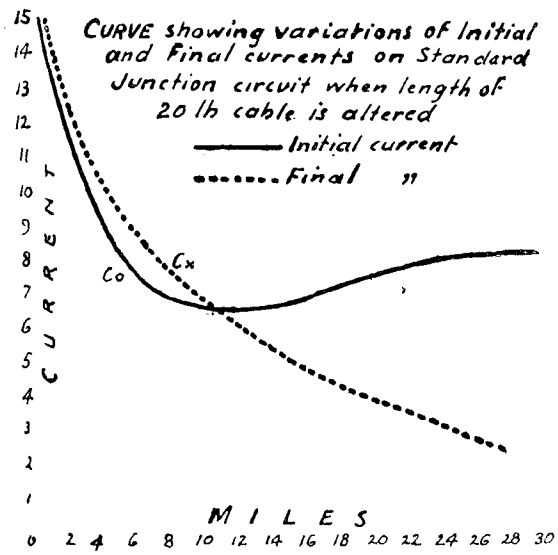


FIG. 19.

By measuring the P.D. across a translator secondary, this has been proved, as the P.D. of the speech waves, under certain conditions, with a single length of cable, was 3·8 volts, and with two lengths in parallel it dropped to 2·2 volts. As illustrating the ignorance which seems to prevail on such important points as this one, it has frequently been suggested that the talking efficiency of a long cable line might be increased by using pairs in parallel.

Talking Efficiencies of Apparatus and Circuits.—A few particulars regarding efficiencies of different systems may be of interest.

The Western Electric Common Battery system has the highest all-round efficiency of any which the Company have measured, and taking it at 100 per cent., we get for the local battery system, with hand microtelephones and cells in the average condition, 70 per cent. efficiency. The same system with the H.M.T., replaced by a fixed Ericsson transmitter, has an efficiency of about 90 per cent.

Devices for attachment to Telephones.—There has lately been quite an epidemic of patent earpieces and mouthpieces, claiming hygenic or transmission advantages, and whilst on the best of them the hygenic advantages are, to say the least, doubtful, there has been in every case tested very considerable decrease in transmission efficiency. One arrangement for which secrecy was claimed, on the ground that it was only necessary to whisper into the patent mouthpiece, actually reduced the efficiency by 20 per cent., so that it was really necessary to talk louder.

The prevalence of such apparatus and their accompanying fairy tales, has been very likely due to the absence of definite and scientific testing arrangements in the past.

To conclude, I must express my indebtedness to Messrs. COOTE, SHEPHERD, ALDRIDGE, and STILES, who have been engaged for some time with me in carrying out transmission investigations.

PRIVATE BRANCH EXCHANGE OPERATING.

BY W. F. TAYLOR, *Contract Agent, Glasgow.*

IN making a study of the future development of the telephone in this country, we are brought face to face with the fact that a very considerable proportion of the increase in stations is bound to come through the medium of the private branch exchange. There is, I think, no doubt that a great field for this class of service lies fallow, simply waiting for us to sow our seed, and by careful attention to the usual rules of husbandry, as practised by every contract department, in due course we shall reap the fruits of our labours. Admitting then, that we may expect a large increase in the number of private branch exchanges, it will be necessary for us to see that these are arranged in such a way as to give entire satisfaction to both the subscriber and the Company, and in my opinion nothing is so likely to bring this about as good operating. The operating of private branch exchanges has long been recognised as a most important point by our cousins across the Atlantic, and it is a startling and striking fact that in New York there are more trained operators employed by subscribers to work their private branch exchanges than there are at the present moment in the service of the New York Telephone Company. From this I think it can be fairly deduced that not only has the New York Company seen the advantages to be derived from supplying trained operators for private branch exchange work, but the subscribers also recognise them, and having recognised them, are not like the ultra-conservative people we have to deal with, in that they do not grudge the little extra expense entailed by employing a trained telephone operator. Have we recognised the importance of supplying subscribers with trained operators? If so, are we training our subscribers to look at it in the same light? I am afraid we cannot answer these questions in a satisfactory manner. Hundreds of subscribers who should have trained operators to attend to their switchboards are still struggling with that worst of all operators, an office boy, whose time is divided between the telephone switchboard, running messages, and licking stamps. No wonder we have long delays in getting subscribers to answer their telephones; no wonder we have from 20 per cent. to 25 per cent. of ineffective calls; no wonder we get subscribers growling about the service now and then.

How are we to cure these troubles, or at least modify them? Well, in my opinion, a trained operator in charge of a busy subscriber's telephones would very largely assist in improving the service. This is borne out by a number of our Glasgow subscribers, who, after much labour on our part, were induced

to contract with the Company for thoroughly competent operators to work their private branch exchanges. After this arrangement had been in existence for a short time, we asked the subscribers for their opinions of the new method of working; one and all have nothing but praise for it, as the following few extracts from their letters will show:—

From a Firm of Maltsters.

". . . We can very genuinely testify to the tremendous advantage it has been to us to have arranged as we did with your Company to have a complete and proper installation of telephones in the different departments of our office, with branch connections to our various works, and to have one central exchange for all, with an operator whose duty is to attend to this exchange, and nothing else. . . . Another advantage is that when we on our part wish to call up any subscriber, we simply, through our individual instruments, inform the operator whom we want and leave the call with her until the subscriber is got and put through to whoever passed the call. . . . The moderate extra expense incurred for putting in this installation is real economy in the end, and we certainly think that other large firms who once adopted this arrangement would never think of giving it up"

From a Firm of Warehousemen.

". . . We have pleasure in informing you that we find our private telephone exchange of great assistance to us. It saves the time of our partners and buyers, as the operator is able to get the connection, and they only require to speak when the connection is made. . . ."

From a Firm of Shipowners.

". . . We have pleasure in stating that although we were very reluctant to adopt your suggestions of a private exchange, we are now of the decided opinion that it has been a decided advantage. . . ."

From a Firm of Shipbuilders.

". . . We could not possibly work our establishment without a private exchange and special operator. . . ."

From a Firm of Merchants.

". . . We have a general switchboard with two trunk lines, attended to by a lady operator. . . . We have found it very serviceable indeed, and would be pleased if the system were more generally adopted. . . ."

From a Firm of Shipbuilders.

". . . We beg to state that since the exchange has been fitted up and worked by one of your lady operators, same has given us entire satisfaction . . . and has entirely removed what was formerly a source of trouble and annoyance. . . ."

From a Firm of Engineers.

". . . Our operator in the switchroom at the top of the buildings switches the calls on to the appropriate departments throughout the premises, and the principals and heads of departments have no hesitation in giving personal attention to calls, knowing that the time required has been reduced to a minimum. . . . After our experience of the switchboard as a means of facilitating our business, we would almost as soon contemplate the abandonment of the telephone connection altogether as the reversion to the old system. . . ."

From a Firm of Chartered Accountants.

". . . A special telephone operator performs all the work of connecting and disconnecting. . . . The additional expense involved is, we think, fully repaid by the advantages of smooth working and promptitude, and the avoidance of confusion in the office. . . ."

From a Public Institution.

". . . I have pleasure in stating that in this office it would be a perfect impossibility to conduct our large telephone business without a special operator at our private branch exchange. In getting connection with other subscribers it is a frequent complaint that the principals wanted cannot be switched on without considerable delay, largely due to inefficient private operators, such as boy clerks or other junior subordinates."

From an Educational Institution.

". . . I have no hesitation in saying that since we have had the services of a trained operator we have got a much better and quicker service than we ever had before. . . ."

From a Firm of Engineers.

". . . There is also an absence of discomfort or annoyance when getting a connection through the public exchange, because our operator is a National Telephone employee, and alone deals with the operation in the public exchanges, and being familiar with the methods to which the operators are trained, any unpleasant experience which the private individual might have when calling the exchange disappears. Our telephone system is now as perfect as one could reasonably wish for. . . ."

These, I think, speak for themselves, and we may pass on to consider the three ways of dealing with the operator question:

(1) The subscriber may contract with the Company for the services of an operator.

(2) The subscriber may take one of the Company's operators into his own service.

(3) The subscriber may choose a likely girl and send her to one of the Company's exchanges to learn the rudiments of the work.

In Glasgow we have pushed the first arrangement principally, and at the present moment fourteen subscribers have Company's operators at their branch switchboards. We consider this method the most satisfactory from every point of view. The operator is under the direct supervision of the Company's traffic superintendent and matron, and this conduces to smartness and smooth working. She is in the same employ as the operators in the exchange to which the subscribers' lines run, and is, therefore, more likely to work harmoniously with them. She is able to give the Company many valuable hints as to extra facilities required, or as to subscribers whose lines she frequently finds "engaged."

This arrangement has the additional advantage of being more flexible than the others. It allows of the Company replacing an operator who may prove unsatisfactory, and of providing a substitute when the regular operator is ill or on leave, thus avoiding any risk of upsetting the subscriber's business.

With reference to No. 2, the operator leaves the Company's service and enters that of the subscriber. She has the advantage of the Company's training, but she is no longer under the control of the Company's officials. The subscriber also has to make his own arrangements regarding illness and holidays. This point is got over by some subscribers here by the simple expedient of obtaining a temporary substitute from the Company when necessary, an arrangement which, so far, has proved quite satisfactory.

Then, as to No. 3 arrangement, if we fail to get a subscriber to adopt either 1 or 2, why should we not offer to take a suitable girl chosen by him from his own staff into one of our exchanges for, say, a week or a fortnight, to give her an insight into telephone operating generally? The training will be very incomplete doubtless, but she will have learned something of what goes on at "the other end of the wire"; besides this, her visit will engender a feeling of comradeship with the Company's operators which will help to smooth over many little difficulties, and when she returns to her own switchboard she will have learned enough to make her a long way better than the wholly untrained operator to be found to-day in so many places.

In conclusion, I feel sure that once subscribers realise that for quite a small sum over and above what they pay for their telephone equipment, they can get, by employing a trained operator, a telephone service such as they never dreamed of, we shall find that one or other of the above systems will become popular, and the service will benefit to an extent that must be experienced to be properly appreciated.

A RELAY FAULT.

WE frequently, in the course of our work, come across extraordinary faults. I give below particulars of a fault recently discovered which should be of interest to readers of the JOURNAL.

A complaint was received from a subscriber that he was unable to obtain the exchange, and, upon investigation, a sectional fuse was found to have blown, but no trace of a short circuit could be found anywhere. Upon further investigation, however, it was found that the relay rack, which is fitted with retaining relays, had been jarred and that a large number of relays on this section had made contact, thus blowing the fuses, which, of course, had the effect of restoring the relays and leaving no trace of the cause. It points to the fact that this type of relay should be fitted in an unshakeable frame, if such a thing is possible.

THE OFFICE BOY.

BY H. MARSHALL, *Leicester.*

OWING to the remarkable growth in recent years of female labour and the rapid increase in the number of lady clerks, an office career does not offer the attraction it once did, and consequently the number of aspirants for the position of "office boy" has become less than formerly. In manufacturing centres where there is a large demand for youthful labour, the number is often very limited. True, the supply is always in excess of the demand, but the selection is restricted as to quality, as, apart from applicants for positions in the Civil Service, in banks, and similar solid institutions, the better class of boy does not make office life his calling in any large numbers. It now often happens that after passing over applicants whose writing is poor, who cannot spell correctly, who are too young, and so on, a vacancy has to be filled with one whose promise of efficiency is doubtful.

In many instances parents, in their eagerness to get their son "into something" as soon as he can leave school, jump at the first opportunity that offers, without for a moment considering whether or not the boy shows any adaptability for the post. This seems to be the reason why many boys turn out failures, and unless circumstances remove them to other spheres of labour, as often as not the farthest they get is to the position of junior clerk.

The National Telephone Company offers in its various departments more advantages than most commercial businesses to the boy setting out in life; therefore, the best selection having been made, the boy's progress should be carefully noted, and, if it appears that his tendencies incline more towards electrical, engineering, mechanical, or drawing work, than to purely office work, it will surely be to the interest of the Company and of the boy himself to transfer him to whichever department he shows himself most suited for.

In any case, a smart office boy having been obtained, an effort should be made to train him well. He should not be left to become merely a mechanical instrument for filing and delivering letters, etc., but having been made aware of the possibilities before him, he should be encouraged to qualify himself for promotion as quickly as possible. He should be recommended to keep up his studies and to improve his earning power by attending technical classes, or by learning bookkeeping, shorthand, etc.

His work should be well supervised; civil speech, neatness in handwriting, accuracy in details, and general smartness should be insisted upon; punctuality and strict attention to instructions should be impressed upon him; unless these habits are learned early in his office career, the lack of them is likely to be the cause of trouble later on when he fills a more important position.

Another point is that a boy showing himself capable ought not to be kept as office boy until he has altogether outgrown the position. At the end of, say, two years an opening in one of the office departments should be found for him. Numbers of boys, seeing no immediate hope of getting out of the position, are led to resign and seek employment in warehouses and factories where the prospects and remuneration are better for the time being, rather than wait what seems to them an indefinite time for the moment to come when they shall drop the title of office boy and advance a step forward in life.

A good deal more could be said about the office boy, but this is only intended as a short article to give a few thoughts and suggestions which have occurred in considering the subject from a general standpoint.

PAT'S WAY.

THE doctor had engaged a new coachman—an Irishman. As he stepped from his trap after a round of visits his coachman said:

"The oats are getting low, sir."

"Very well; you telephone Smith & Brown to send up some."

Pat went to the telephone, and the following conversation took place:

"Is that Smith & Brown's?"

"Yes."

"Well, you send up six bags of oats, and hurry up with 'em."

"All right. Who are they for?"

"Arrah, now don't be fooling! For the horses, to be sure."

And Pat rang off.

"SKIPPED POSSIBILITIES" IN CANVASSING.

BY R. A. WATSON.

THERE is one particular aspect of contract department work which so far does not appear to have been dealt with in the JOURNAL. It is rather difficult to define, but perhaps the term "skipped possibilities" describes it, if not elegantly, fairly accurately.

There are still a great many people in every town whose names do not appear in our Directories. Many of these have been canvassed, but I think it will be generally admitted that a certain number of them have been, for all practical purposes, "skipped."

This is due to a peculiar tendency said to be general in all classes of canvassers, viz., the disposition to pass over prospective subscribers without any but the most superficial investigation of their willingness to take the service, and doubtless in many instances, no investigation at all. There is no valid reason for this, but man is a creature of prejudices. Prejudice leads to preconceived notions; means ignorance—the opposite of enlightenment.

This "skipping" is possibly more prevalent in younger canvassers, and is perhaps principally due to a lack of experience, although older men are subject to it.

Somehow the canvasser gets the idea into his head that So-and-so are "no good," "nasty people," "hard customers," etc., and so they are never called upon. Often these ideas are obtained from members of the company's own staff, one canvasser hears it from another, or maybe he asks an office clerk; or it may be just a casual idea with no real basis.

The cure for this sort of thing is for every canvasser to start on his district or area afresh—absolutely *de novo*. Dismiss all preconceived notions, and as regards the personality of some prospective subscriber you are calling on, don't ask advice; go out and meet him, confident of your ability to do justice to the Company and to yourself. For why? Well, is it not safer thus to form your own opinion, based on personal observation? All you may have heard about a man may be absolutely wrong. Consider the varying moods of a man. If you ask a friend or a subscriber, or a fellow canvasser, and he happens to be feeling a bit down—had a bad day you will get a discouraging answer; if he had felt optimistic and answered accordingly you would have gained nothing, you may still be in for a "tough proposition"; if otherwise, you would have proved it yourself.

So far as going to see a doubtful or difficult man is concerned, it is the worst thing to depend upon your instinct—or on a snap judgment, as it were. Don't let a man's appearance have an unprepossessing effect. Try to rise above your prejudices; show your broadmindedness, and you may find that man to have been particularly worthy of your attention. That this tendency to "skip" is in evidence among contract staffs is proved, otherwise there would be no necessity to transfer men to fresh areas. This is hardly creditable to the canvasser, but there is no doubt of the proceeding being beneficial, inasmuch as the men transferred will each accumulate a lot of new and useful information which had previously been missed. Each will step into houses which his predecessor had missed right along; but neither having any old time prejudices, new business quickly results.

Another thing, don't leave a man who states the price is too high. If that is his sole objection to the service, then comes the chance of the high quality canvasser. Outside an auction room price does not produce a sale. Persuasion or cooing should not be attempted—the Company is not an object of charity—and a subscriber won by such means would think the Company under an obligation to him ever after and probably prove more of a nuisance than what he is worth. The canvasser should hammer away to convince the prospective subscriber that he *needs* the service, that it will make him money, increase his business and custom, and that by means of the Directory he will obtain a fine and permanent advertisement.

Of course, a certain conciliatory manner is necessary, and one should study the idiosyncrasies of the person called upon; but it

should be the first aim of the canvasser to firmly implant the conviction that the service is the one thing to be desired for the furtherance of business or the increase of domestic comfort.

This method will at least command the prospective subscriber's respect, and will probably add one more atom to that valuable commercial asset—"goodwill."

INITIATIVE.

THE salesman talks of W. C. HOLMAN, says the Philadelphia *Telephone News*, relate the story of a man with initiative who started in his home town where his product was manufactured, "a city that had been worked harder than any six square miles of space in the United States," and succeeded in being high man among 1,000 salesmen scattered all over the civilized world. His own explanation of his success was: "That territory is all right. It's a good field for our product, but the prospective purchasers had heard our regular line of talk so often in the last five years that they had grown hardened to it. I tried to make a study of each man's particular case, so as to give him an approach and a set of arguments that would be new to him."

If this can be done in one line of business, it can be done in our line of business. When we bear in mind Mr. TRAFFORD'S test in the "new spirit" talk, "wherever there is a need for communication there we will place a telephone," we see that a territory that looked thin and unpromising really bristles with opportunity. Wherever there is a need for communication—why, that's everywhere!—and just everywhere is where telephone contracts can be got. Worked out! There is hardly a territory that has been scratched below the surface. What do you think of a row of sixteen new three-storey houses, renting at good figures and with good facilities for giving prompt service, with only three subscribers connected? That is in a district which is so "checked and held for spares that it is impossible to keep up to the estimate," and the same field exists in any district or locality.

Just two years ago a solicitor reported to his district manager that there were just twelve more possible contracts in a certain town. We then had 491 stations in service. The latest traffic report shows 1,053 stations connected, most of these having been secured by the same solicitor who thought the territory worked out. The Company nearly always has a man who can take a "worked-out" territory and make the man who "worked it out" look so small as to be hardly perceptible.

All members of National Contract Departments please note.

LOCAL TELEPHONE SOCIETIES.

Birmingham.—The first of the summer lectures to about 40 of the Birmingham and district staff took place on the last Thursday in June. Mr. May greatly interested the members. A unanimous wish was expressed to have these lecture fortnightly, instead of monthly, as first arranged.

A PLUCKY RESCUE BY A TELEPHONE MAN.

As a proof of that alertness to which a telephone man becomes trained by his daily work, which, as we all know, at times requires prompt decision and smart action, *it is pleasing to report the following incident*:—

On the evening of July 3, after the completion of his day's work, Chief Inspector Berry repaired to that favourite Jersey bathing rendezvous known as Havre-des-Pas and enjoyed his usual refreshing dip in the briny. After his swim, he was fully dressed and homeward bound when he suddenly heard cries of distress, and upon looking round saw a young man about eighteen years of age on the point of drowning. Without hesitation, and without even taking off his coat, Mr. Berry at once jumped into the sea, which at this spot was about ten feet deep, and succeeded in catching hold of the sinking person and in bringing him safely ashore. For this smart and timely rescue of a fellow-being the National Telephone Company's staff heartily congratulate Mr. Berry, and feel proud of having a man capable of such prompt and humane action on the roll.

HANDLING AND FILING CORRESPONDENCE.

By P. H. C. PRENTICE, *Engineer-in-Chief's Department.*

THE need for system and organisation generally in business matters requires no argument from me, but if there is one thing where system is imperative, though unhappily seldom adequately recognised and employed, it is the handling of letters and papers received and their ultimate disposal.

So much hinges on a correct method of dealing with papers and being able to lay hands upon any desired file without delay that a system, and a system of the most effective character, is of first importance.

Who does not know the trouble and annoyance caused by inability to locate some papers which are suddenly and urgently wanted. The office boy is usually told to bring them in. He cannot find them, a clerk is sent after him, others join in the hunt, the whole department is turned upside down, but still the papers cannot be traced. There is a general feeling of upset and irritation which reacts detrimentally on everyone, but probably the cause of the whole trouble is want of system.

A system which I think is both ingenious and effective has existed for over two years in the Engineer-in-Chief's department. A description of it may be of benefit to others.

The chief points in the system are four—

1. A card index of letters received, kept by name.
2. do. showing where those letters are.
3. do. of the letters, kept by subject.
4. Vertical filing cases.

Nos. 1 and 3 are records which enable any letter or set of papers (with the identifying numbers) to be traced either by the names of the correspondents or by the subject matter. No. 2 is an index by which the whereabouts of the papers can immediately be traced.

It will be best to describe the course of a letter through the department, and so bring out the various features of the system. On arrival the letter is stamped with a circular stamp, having the Company's name in the outer circle and within the word "Received" followed by the date, with the word "Answered" beneath, with a blank following. It is then stamped by means of a Bate's automatic numbering machine (which will, by a simple adjustment, duplicate a number, repeat it indefinitely, or stamp it once only before it changes to the next); at the same time a card (No. 2) is stamped on its projecting tab with the same number; the subject of the letter is written on the card, which is also date-stamped. Then the letter goes to the registering clerk, who selects the card of the correspondent from the index (No. 1) and enters upon it the date, number, subject, and to whom it is referred. The letter is then sent to, say, the Test Department, and the tracer card (No. 2) is placed in numerical order in the index under a guide marked "Test." On the top left-hand corner of the letter the reference number of the department to which it is issued is written. This indicates at once to the clerk distributing the letters to whom it should go. In due course the letter is replied to, the writer of the reply quoting the number allotted to the correspondence and marking the original letter with the date answered and his initials in the blank provided in the stamp at the head of the letter. (The benefit of so marking the letter is that should the papers become separated there is still no doubt as to whether the letter has been answered or not.)

The carbon copy of the reply is attached to the letter, and, if further correspondence is anticipated a white "waiting slip" is attached, stating that the papers are required by such an officer on such a date.

In the ordinary course, he marks the date on the waiting slip as the 1st, 10th, or 20th of any particular month, as upon those dates the whole of the papers in the vertical filing cases are gone through and those which, according to the waiting slips, have matured, are taken out and sent to the departments concerned, so that if they wish to deal with any matter which has not been replied to by that time they are enabled to do so. Should, however, any papers be specially wanted at a date other than those specified, a pink waiting slip is attached instead of the ordinary white one, and the filing clerk, seeing this,

books that particular number in a diary provided for the purpose. This is examined day by day, and any papers noted therein are brought out on the due dates. The reason for appointing certain dates for taking out the live papers in the way described is that failing such an arrangement, it would be necessary to go through the whole of the contents of the live files every day, in case anything had matured, and that, with several hundred batches of correspondence, would cost considerable time. After the waiting slip has been attached the papers are sent back to the filing department where the clerk removes the card (No. 2) from the compartment it was first placed in to another, showing that it is a matter waiting reply. The papers go into the live portion of the vertical files (No. 4) until the time the reply arrives. During the day the letter, along with all the others received, is indexed by its subject (No. 3).

Now assume another stage. In due course, a reply comes in; as it bears the reference number which has been allotted to that matter, the filing clerk looks in the compartment of the tracer cards representing matters awaiting reply, takes out the card bearing the corresponding number and when the new letter has been entered on the No. 1 card and sent to the department for which it is intended, the card is again placed in that portion of the tracer card index which represents that the papers are in that department. Suppose that later the papers have to go from the first department to another, say, the Estimate Department; on the filing clerk receiving the paper for transfer he shifts the tracer card accordingly, or, if the papers be sent direct from the first department to the latter, then a special advice slip, provided for the purpose, must be sent to the filing clerk as a notification to move the tracer card from the "Test" division of the index to that marked "Estimates." When the papers come at last to be filed the tracer card is taken out of the Department division and placed, still of course in numerical order, in the compartment marked File. Thus, wherever the papers go, the tracer card is moved correspondingly in the No. 2 index and is an unfailing guide to the location of the papers.

An essential feature of the system is the Subject Index (No. 3). This—the key to the whole—requires most careful and intelligent handling, and too much care cannot be taken in settling on the heads under which the indexing is done. It is quite evident that it is of paramount importance in the indexing of any matter that its title should be so given that it not only covers the data concerned, but that it should be in the form in which the idea will most readily occur to the mind when the matter comes up. The importance of this point is demonstrated by experience, but it is generally not properly recognised.

When seeking any batch of papers, the common guiding idea is the subject matter of it, and with the subject index the idea is not to classify on the old alphabetical or similar arrangement, but by the subjects of thought themselves. It goes without saying that the lay-out of the subject index must vary with the requirements of the users, but to help a right appreciation of the underlying idea I will briefly sketch the basis of the index designed for the special purposes of the Engineer-in-Chief's office. When starting it we considered what was the logical order it was desirable to follow, and decided to make two main divisions, viz.:—"Outside" and "Inside Work," sub-dividing the former into "Overhead" and "Underground," and the latter into "Instrument" and "Exchange." To take care of such items—and they are very few—which do not properly fall under the headings mentioned, a "General" sub-division was also made. These divisions were again cut up by guide cards marked thus, "Cable," "Poles," "Arms," "Insulators," "Payments," and so forth.

Take a suppositious case A correspondence takes place regarding a contractor's account for underground work and another relative to payment for a switchboard. The register clerk in indexing the first turns to the "Outside" division of the cards, the "Underground" sub-division, and then selects a card under the guide "Payments" for the requisite entry. In the second case he turns to the "Inside," then "Exchange," and last the "Payments" card. This, I think, makes the idea plain. Lest my description may have conveyed the impression that the method is involved and cumbersome, I must say that the index in operation is simplicity itself. The time and care spent daily on it are well employed, as, when sudden enquiry is made for certain matter, there is no need to attempt to approximate the date of it, or even remember with whom the correspondence was transacted (data which were necessary to find papers under the old system of flat filing under correspondents' names), but the number of the papers can be quickly ascertained from the subject index, and their whereabouts located by the tracer cards.

A most useful feature is the tracer index (No. 2), which shows exactly in whose possession papers are. By means of this index the head of each department can ascertain exactly what papers are in his own or his assistants' hands to be dealt with, and the Engineer-in-Chief himself has a ready means of knowing the position of the whole of his correspondence.

The vertical file is perhaps not familiar to all readers of the JOURNAL, so I will briefly refer to it.

Vertical filing means that instead of papers being put away flat in boxes—as in the old style—they are laid in stout manilla folders which are filed *on edge* in a cabinet with the open side up, just like closed books resting on their backs; the folders are retained in position by an adjustable block which can be moved back as the space fills up. Each folder is capable of holding a quantity of papers (in the Engineer-in-Chief's department the practice is to allot 50 numbers to each); the system being a numericial one, the folders are divided by stout guide cards with numbered tabs.

Each drawer will hold seven times as much as the ordinary horizontal file drawer, and therefore at one opening as much matter is available as in seven old-time horizontal cases, and in one-seventh of the time. The number can be quickly obtained from a glance at the guides, and the desired papers removed instantly without handling others, which not only is a saving of time and labour, but tends also to preserve the papers in better condition than is possible with the flat-filing system.

I think the rough description I have given will enable anyone to understand the principle and working of a very ingenious and effective method of handling papers.

As regards the debit and credit sides of the system, on the one side is the first cost of the vertical filing cases and of the card index cabinets—not an inconsiderable one—the cost of the indexing and that of the constant handling of the cards. On the other side must be put first—and this is a most important saving—the time saved to each departmental head and other responsible officer who, on account of the facility with which papers can be referred to, is able to do quicker and better work than is possible with the old-fashioned method of filing. The higher efficiency of the system is felt throughout the whole organisation; everyone is better enabled to work without friction and the output of good and useful work is increased. Then, besides, there is the power it gives the chief at any time to inquire into any of the matters in charge of any of his assistants in a manner which no other system affords.

Weighing the advantages I have mentioned on the credit side against the cost of the system, the latter can only be regarded as an investment bearing daily interest.

This system, in common with every other, is not "fool proof"; but the method described is, in my opinion, the best yet devised of dealing systematically with a large amount of detail correspondence.

In comparing it with old methods, I might almost liken it to the common battery as compared with the magneto system. The latter will permit a poor standard of line work to continue undetected, but the higher insulation required on the former compels a higher class of maintenance. Similarly, while arrears of filing, &c., might occur under the old systems, it is an absolutely indispensable condition of the new one that all papers be sent to the filing department and filed away daily and duly indexed.

SAVINGS BANK CLUB, SHEFFIELD.

ONE or two instances have been quoted in the JOURNAL of thrift amongst the staff. It may be of interest to many to know that a saving bank club has been in existence amongst the Sheffield oporators for the last twelve years.

Fifty per cent. of the operators contribute to the club sums varying from 1s. to 6s. per week, one operator at present having £10 to her credit. The fund is principally drawn upon to aid holiday expenses.

The district office staff also have had a fund in existence for some four or five years, the principal object being to aid in holiday expenses.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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THE GLASGOW MUNICIPAL SYSTEM SOLD.

THE event of the past month in British telephone circles was the sale of the Glasgow municipal telephone plant to the Post Office. This sudden withdrawal of the Glasgow Corporation from the telephone field, after a working telephonic existence of barely five years, was voted by the Glasgow Town Council by 45 to 13, with practically no discussion. After prolonged negotiations an offer had been made by the Postmaster-General which enabled the Corporation to retire from the telephone business with a relatively small loss, and this offer was promptly accepted by the Town Council—so promptly that it is not uncharitable to assume that the Glasgow Town Council as a whole were glad of the opportunity of getting rid of the telephone system at this date and so avoiding all risk of the heavy loss which would have been inevitable had affairs been allowed to take their normal course. This historic resolution was passed July 5, 1906, just short of five years after the inaugural banquet of August, 1901, when such great things were prophesied of the budding Glasgow municipal telephone system.

It would be idle affectation on our part to assume on this topic an attitude of aloofness. It interests us keenly from several different points of view, and we feel we cannot do better, both for the information of National workers and for that of other readers of the JOURNAL, than describe some of the salient features of the Glasgow telephone situation and make clear the principal reasons for the failure of the Glasgow municipal enterprise. It is quite natural that members of the Glasgow Corporation should desire to put their own affairs in the most favourable light possible, but in doing so they have been led to do scant justice to the National Telephone Company, and to make use of figures and arguments which will not bear a moment's serious examination. We desire to clear the atmosphere a little by dealing with a few of the main points in the history of the telephone business in Glasgow.

In the first place, it is argued that the Corporation was impelled to take up the supply of telephone service by reason of the inefficient service and high rates of the National Telephone Company. In 1893, when the municipal agitation began, the Company's plant in Glasgow was single wire overhead and worked on the call-wire system. Telephony was a young industry in those days, there was much diversity in telephone equipment all the world over, and the Glasgow plant at the time it was built was fairly abreast of the then state of the art. As telephone engineering progressed, the Company was not only willing but anxious to make improvements, and a little later proposed to rebuild the Glasgow system entirely, putting down a first-class metallic circuit underground plant. This was done in other towns, but the Glasgow Corporation refused to allow the Company to put down any underground work at all. Negotiations by the Company for underground wayleaves and agitation by the Corporation for a telephone license went on for years. A milestone in the agitation was the famous inquiry of 1897. The Commissioner, in his report, found in favour of the Company, holding that the attitude of the Corporation was unreasonable. Finally, in 1900, the Corporation obtained a telephone license and then all hope of the Company securing general underground wayleaves in Glasgow was perforce abandoned, and the period of active competition began. In the meantime the Company had made extensive modifications of tariff, so as to cater for the small user at a low rate, not only in Glasgow but generally throughout Great Britain, and at the time the competition started there was no general complaint as to telephone rates.

The Company proceeded to reconstruct and develop its system in the central part of the Glasgow area by the use of aerial cable; in other boroughs in the area, where the obstruction practised by the Glasgow Corporation was not copied, underground wayleaves had been granted. Members of the Glasgow Corporation now reproach the Company with having refused to re-construct its plant with overhead work prior to 1900, though having made such a re-construction after that date. The answer to that is simple. In the first place the type of telephone cable available in the nineties was not suitable for extensive overhead construction in cities (a lighter type of cable has since been developed), and in the second no sane telephone engineer or manager would spend a large sum of money on the roofs while any chance remained of being allowed to spend it in the proper way—on underground work. That it was "impossible" to do the work overhead nobody ever claimed; the simple facts are that it was neither good engineering policy nor good business policy to do it overhead until the underground wayleave was definitely refused. Then the Company did the work overhead, re-built its exchanges and pushed the development of its business—with the well-known result that it has never had any difficulty in keeping far ahead of the Corporation system in point of number of subscribers. At the present time the Company stations outnumber the Corporation stations by five to two, the actual figures at June 30, 1906, being 27,356 National and 12,821 Corporation.

Turning to the reasons for the failure of the Corporation system, a careful examination shows that they lie deeper than the mere failure to obtain more than a small share of the telephone business of Glasgow. There are three deep-seated causes of failure, and every well-informed telephone man has known that they would surely work havoc in the course of time, and that the Glasgow municipal telephone enterprise was afflicted with the seeds of decay

from its very birth. Three fundamentally wrong assumptions were made, any one of which was sufficient to cause serious embarrassment; the combination of the three entailed certain ruin—or would have if the enterprise had been a commercial concern relying on its own resources. The first wrong assumption was that a modern telephone system could be built and equipped in a large city area for a capital cost averaging £19 per working subscriber's line. The experience of the Glasgow Corporation has proved beyond dispute that the real cost is nearly double the estimated figure—a figure on which Glasgow based its whole case and its attack on the National Company at the 1897 and 1898 inquiries. The second wrong assumption was that a flat rate of £5 5*s*. for unlimited service over an area of 140 square miles would be a paying figure, sufficient to meet all legitimate working expenses and fixed charges and to maintain an up-to-date plant and service. The experience of the Glasgow Corporation during the past year or two has amply demonstrated that the revenue at such a rate is insufficient to maintain the business in a sound condition. The third wrong assumption and the most vitally wrong of all, was that it was practicable to supply an acceptable telephone service in a large and busy city area with an old-fashioned plant and equipment, based on a method of working well-known to be quite unsuitable to the operation of large systems. As one foreign telephone engineer put it, after inspecting the two Glasgow plants several years ago—"the Glasgow Corporation began with what the NATIONAL TELEPHONE COMPANY threw away."

It is this fundamental engineering mistake which has been chiefly responsible for the failure of the Glasgow Corporation in telephony. Had an up-to-date plant been put in and a first-class service given, the other difficulties might have been lived down. Great corporations are not over-particular about their capital expenditure, and when the rates at first fixed were found to be insufficient to give commercial results it might have been possible to remodel the tariff, if the municipal system had given an efficient service and had obtained a real hold on the telephone business of the city. But from the moment the service was found to be inferior any possibility of obtaining the preponderating share of the telephone custom of the city, a possibility, no doubt, regarded as a certainty by the founders of the newer and cheaper system, vanished into thin air. New subscribers naturally flocked to the system which gave the more efficient service, and within a couple of years of the inception of the Corporation service the National system had established a long lead, which has since steadily and rapidly increased.

It soon became evident that the Corporation telephone department, through the defective character of its plans and estimates, had manœuvred itself into an impossible position. The inferior service was a hopeless drag on the development of the system. The service could only be put on a modern basis by a wholesale reconstruction of the plant, involving extensive scrapping of almost new apparatus and additional capital expenditure on a large scale. This large addition to a capital account already swollen far beyond the estimated figure could not be faced, so a deadlock was created. Since a municipal department cannot go into bankruptcy, a way out has been found by the sale to the Post Office.

Reverting to some of the extravagant figures and arguments put forth by members of the Glasgow Corporation, to which we referred at the beginning of this article, we have a word to say on two of these. It was confidently asserted that the National Telephone Company is losing "not less than £40,000 a year" on its Glasgow service. The inconsistency of claiming a profit on the cheap municipal service while alleging that a large loss is made on the service which is supplied at a higher average rate—there are many subscribers in Glasgow who prefer to pay £10 for the Company's service though they could get the municipal service for £5 or less—ought to be sufficiently obvious, but consistency is not always conspicuous in these discussions. Cases where cut-throat competition has destroyed the value of a business for both competitors are not unknown, and it has been a cut-throat competition at Glasgow—initiated by the Glasgow Corporation. But the National business, though its profits have of course been reduced, has by no means been destroyed to the extent imagined by some of the Glasgow town councillors, and the loss of £40,000 a year is purely imaginary. There has been no loss on the Glasgow service.

Another extraordinary figure freely used in the Corporation argument is a mythical saving of £150,000 a year to the telephone users of Glasgow, due to the existence of the Corporation system. This startling figure is arrived at by the following ingenuous process. Every telephone on both systems is counted as bringing in an average rate of £5, and the total revenue so calculated is compared with the total revenue of the same number of telephones at an average rate of £10. In this way a saving of £150,000 a year to Glasgow telephone users is deduced. It is astonishing that such an argument and such figures should be put forward by responsible men in serious debate. In no town in the country is the average rate per telephone £10, or anything like it; £10 is the maximum rate and from that figure the rate per telephone ranges down to £1, so that the average rate per telephone is nearer £6 than £10. Therefore this comparison rests on a false basis, and, even if the other factors were as suggested, must necessarily give an absurdly exaggerated result. But there are two other serious flaws in the argument. On both systems in Glasgow, as occurs on the National systems throughout the country, there are many subscribers at the lower rates who would not pay £10 a year for telephone service. To take credit for saving a man the difference between £5 and £10 when he would never dream of paying £10 is stretching argument a little too far. The third fallacy in this comparison is that every telephone is treated as if it were hired by an individual subscriber. The facts are that more than half the Corporation lines are simply duplicates of National lines, and in this way the competition has forced several thousands of Glasgow business men to pay more for their telephone service than they paid before. As one member of the Council put it, the Corporation could expect little sympathy from the citizens in their telephonic difficulties, as many regarded the Corporation telephone simply as an extra tax. It is quite true that a goodly number of small customers have benefitted by the extra low rates due to the competition, but against this benefit must be set the "extra tax" paid by more than half the Corporation subscribers who have to have both telephones. "A double rate or a partial service" is the invariable result of telephone competition, and Glasgow has been no exception.

We have said a good deal, but we have said less than has been

said by members of the Glasgow Corporation, and there is still one other point we wish to touch on. Members of the Glasgow Corporation claim that they have been forced to sell their telephone system because of the "unfair competition" of the National Telephone Company. To invite a fight and then abuse the victor is perhaps human, but not very dignified. What are the facts as to "unfair" competition? The Glasgow Corporation refused to allow the National Telephone Company to build a modern underground plant, but retained for themselves the monopoly of the Glasgow streets. The Glasgow Corporation started an opposition telephone business, and cut the rate for unlimited service in half, although advised by every responsible telephone authority that the estimate which apparently justified the cut rate was delusive—and it has been proved delusive by hard experience. Mr. GAINE informed the Glasgow Corporation that he desired peace, that he desired to serve Glasgow efficiently in the proper way, but that if the National Telephone Company were attacked the National Telephone Company would fight. The Corporation attacked, and the National has fought and won. By superior organisation, superior service and superior knowledge of the business, the National has beaten the Corporation all along the line. The National has not reduced its flat rate, despite the difficulties caused by the artificial rate quoted by the Corporation, and all the advantages of free use of the streets, aid from other Corporation departments and powerful local influence have been entirely on the Corporation side. We think any "unfairness" in the competition will not be found by the impartial critic to lie with the National Telephone Company.

THE PRESS AND GLASGOW.

OFFICIAL apologies for the sale of the Glasgow municipal system have been sent to the Press and have been printed in a few of the journals which favour everything done in the name of municipal trading. The general tenor of the circular article is that a conspiracy between the Local Government Board, the Post Office, and the National Telephone Company has prevented the telephone municipalities from making the progress outlined for them by the enthusiastic promoters of municipal telephony. That the Local Government Board has nothing to do with Scotland, and that the Post Office authorities have scrupulously refrained from interfering with the municipalities in their eccentric telephone work are facts which spoil the effect of the municipal apology for those readers who know anything of the circumstances of the case, but do not bother the *Daily Chronicle* or the *Municipal Journal*. Generally throughout the Press, and especially in the Glasgow papers, the Glasgow Corporation find little sympathy, as for some time past there has been a growing revulsion of public opinion against excessive and reckless municipal trading. Some of the more enlightened technical papers, such as *Engineering* and the *Electrical Review*, print articles showing that in those quarters where the technical features of the telephone business are understood the unsoundness of municipal telephony is thoroughly appreciated; these articles we reproduce for the general interest. In the circular apology referred to above it was claimed, with an extraordinary disregard of historical accuracy, that the Glasgow Corporation would have adopted common battery working in 1900, had the patents been available. On this point we reprint from the *Electrical Engineer* an interesting letter by Mr. H. LAWS WEBB which goes to show that the technical adviser to the Glasgow Corporation, when the method of working to be adopted was under consideration, reported against the common battery system, and even against the method of automatic signalling, in the most emphatic manner.

OUR PORTRAITS.—SPECIAL NOTICE.

SEVERAL correspondents have suggested that the portraits accompanying the biographical articles should be printed on separate sheets in order that those desiring to form collections may have the pictures framed. Owing to the expense of printing and handling separate sheets it is not practicable to carry out this suggestion, but the Editing Committee have pleasure in announcing that arrangements have been made for a limited number of each portrait to be reprinted on stout art plate-sunk boards, suitable for framing, and these will be obtainable at 6*d*. each. Those desiring to obtain copies of the portraits of Mr. GAINE, Mr. FRANKLIN, and Mr. CLAXTON, will kindly send in their orders, accompanied by remittance, as early as possible.

MUNICIPAL TELEPHONE ENGINEERING.

THE following letter, which appears in the *Electrical Engineer*, on the technical points connected with the Glasgow Corporation telephones will be of general interest:—

Sir,—The article on the above interesting topic contains at least one statement which, in the columns of a technical journal, should not be allowed to go uncontradicted. It is stated, in relation to the plant of the Glasgow Corporation, that one of the two objections made by the Engineer-in-Chief of the Post Office was "in connection with the switching system, which was adopted in view of the fact that the patents for the common battery system, of which the Post Office specially approved, had been cornered by the National Telephone Company, and were consequently unavailable."

As I find the same statement in another paper over Mr. A. R. Bennett's name, I assume that Mr. Bennett is the original author of it. The clear meaning of the statement is that had the common battery system been "available" in 1900, Mr. Bennett would have adopted that system in the Glasgow Corporation plant. As the columns of the *Electrical Engineer* have shown in the past, any statement by Mr. Bennett on matters telephonic is always most effectively and explicitly contradicted by some other statement by Mr. Bennett on the same subject. This case is no exception to that rule.

In 1899, when the Glasgow license was under consideration, the Postmaster-General sent to the town clerk of Glasgow a draft of a general specification for the projected Glasgow municipal exchange. Clause 9 of this specification read as follows:—"The means of obtaining the attention of an exchange by a subscriber shall be automatic—*i.e.*, the lifting of a telephone shall actuate the calling apparatus at the exchange, and the replacement of the telephone shall indicate automatically the close of the conversation." This specification was submitted to Mr. Bennett for consideration, and he reported as follows:—

Rule 9.—"I cannot undertake to provide a satisfactory system if this rule is enforced. . . . Calling by lifting the telephone off the hook saves no time, although it looks plausible on paper, because a subscriber can touch his bell with the right hand and lift the telephone off its hook with the left before the operator can possibly plug in to reply. But calling by this method is not so objectionable as the other stipulation that the termination of a connection shall be signalled by hanging up the 'phone. . . . When a subscriber is unable to answer a question by telephone without referring to a paper or another person, the natural impulse, which he nearly always obeys, is to hang up the 'phone for a moment, an action which by the prescribed method would cause his instant disconnection. It has grown a practice with subscribers to push down the switch arm of the instrument with the finger when they wish to speak to another person in the room without letting their correspondents at the other end of the line hear what is said. By the prescribed method this would lead to immediate disconnection. The rule, if enforced, must lead to serious delay in switching subscribers through, because the duty, which in a good system is left to the calling subscriber, of ringing the called subscriber's bell is thrown upon the operator."

Mr. Bennett then went on to describe the two methods known to him of effecting what the Post Office proposed. With regard to the common battery system he reported as follows:—"An American company claims to own the British patents for this system, which is less objectionable than the Post Office's, although possessing certain drawbacks of its own." It will be clear from the above report, which was made in December, 1899, that Mr. Bennett—at the time the design of the Glasgow municipal system was under consideration—not only condemned the common battery system, but condemned the very principle of automatic signalling.

I may add that the fatal error of adopting the call-wire system, which Mr. Bennett at the time considered superior to the common battery system, but which all telephone engineers know to be the least efficient method of working a group of telephone exchanges in a large city, has been principally responsible for the failure of municipal telephony at Glasgow.—Yours, etc.,

35 Old Queen Street, S.W., July 17, 1906. HERBERT LAWS WEBB.

"ENGINEERING" ON THE GLASGOW TELEPHONE SALE.

THE experiment in municipal telephony at Glasgow has come to an end by the transfer of the system to the Post Office at a price which is expected to show a loss of about £15,000. The total capital expenditure on the system now reaches some £380,000, and the difference between that figure and the purchase price of £305,000 will be made up by payments to sinking fund already made, and by a contribution from the Glasgow rates. It was brought out in the discussion on the proposed sale that the National Telephone Company was willing to purchase the Glasgow system at its full book value, which would mean a price £20,000 to £25,000 higher than that offered by the Government. But the Glasgow municipal telephone undertaking has been throughout run in opposition to the Glasgow business of the National Telephone Company, and by 45 votes to 13 the Council resolved to forego £25,000 rather than transfer their telephone venture to the successful rival.

On several occasions during the past three years we have shown that the Glasgow Corporation telephone business was on wrong lines, both technically and financially. The errors made in the original plans and estimates, and in the class of plant and method of working adopted, were radical and far-reaching. Their effect was quickly evident, and could only have been overcome by a complete reconstruction of the plant and of the business. This has been practically admitted in Glasgow, as on several occasions it has been proposed to reconstruct the switchboards and telephones, and to raise the rates. But to do these things would have upset the finances, upset the service, and upset the public. So the Glasgow Corporation felt compelled to struggle on until a purchaser for the whole undertaking could be found. In the meantime, the inferior service of the municipal telephone department enabled the National Company to forge so far ahead that the Company's system is now more than twice as large as that of the Corporation, and is still increasing rapidly, while the latter for a long time past has been virtually stationary.

There have been occasionally some heated letters in our correspondence columns from defenders of the Glasgow telephone enterprise, who have disagreed with our strictures on the plant used and on its excessive cost. But it has long been indisputable, from the official figures, that the system has cost, in proportion to subscribers served or to revenue obtained, nearly double the estimated figures on which the business was founded. On the other points—the quality of the plant and the importance of depreciation—we are now amply confirmed by the Chairman of the Telephone Committee. In his speech in support of the proposed sale, Mr. ALEXANDER said: "Another objection to the Corporation continuing to work the telephone system is the fact that it would be necessary to borrow at least a sum of £100,000, in order to make the necessary alterations on the switchboard, and to carry on the system, and to meet the capital expenditure necessary in view of the increasing number of subscribers." The "increasing number of subscribers" has not been a serious factor for two years past, judging from the official statistics; but the "necessary alterations on the switchboard," which is Mr. ALEXANDER'S phrase for re-equipping the exchanges and subscribers' stations, would cost well over £100,000, without bringing in a penny of extra revenue.

Nobody will be disposed to quarrel with the Chancellor of the Exchequer for giving a liberal price for the Glasgow plant. The Post Office engineers, doubtless, have no delusions on the subject, and know well enough what they are buying, and how much more it will cost them to bring it up to Post Office standards. But it is a great deal better that a hundred thousand pounds of public money should be wasted now than that the sound and sane development of the telephone service should be indefinitely obstructed by an uncommercial competition. The municipal telephone competition was brought into being by a late Minister who was influenced by entirely erroneous notions concerning the telephone business. The public invariably has to pay the price of the errors of Government officials, and the best thing is to pay up and look pleasant. Fortunately for the Government, municipal telephone systems are few and far between. In every instance the municipal telephone systems are carried on at uncommercial rates, and even so have failed to attract more than a small proportion of the telephone-using public. Under these circumstances the transfer of the municipal telephone concerns to more capable hands has been inevitable, and it is only municipal pride that has hitherto stood in the way.

A TELEPHONE DERELICT IN PORT.

No reader (says the *Electrical Review*) who has followed the short history of the abortive municipal telephone undertaking at Glasgow can have been surprised at the decision of the Glasgow Town Council to sell out to the Post Office. Notwithstanding all the clamour made by the municipal enthusiasts, all the talk about cheap and efficient service, all the ingeniously arranged figures in the accounts and statistics, it has been evident for a long time past that the Glasgow telephone venture has proved an ignominious failure. In the competition with the National Telephone Company, the Corporation telephone system was beaten to a standstill two years ago, and it has for some time past been looked upon by Glasgow business men merely as a standby, so completely has it been overshadowed and enveloped by the system of its more progressive and alert commercial rival. This result was entirely unexpected by the Glasgow councillors. In fact, the expectations were all the other way, and Glasgow started in the telephone business with the confident hope of extinguishing the service of the National Company, and of establishing another municipal monopoly. It is a bright feather in the cap of private enterprise that a great and wealthy Corporation, with all the local influence that a big trading Corporation possesses, should have been so signally defeated in such a short time. That the Glasgow Corporation would sell their telephone system if they saw the least hope of working it at a profit, or of maintaining their ground in the competition, is not to be imagined for a moment. The sale means that the Corporation realise that the position is hopeless, and are glad of the opportunity of retiring—without the honours of war.

While it is true that the active and well-managed competition of the National Telephone Company has completely checked the progress of the Corporation system, it is also true, as has often been pointed out, that the Corporation undertaking was unsound from the very start, and was foredoomed to failure. The estimates and plans were erratic and fallacious in the extreme, the rates adopted were unremunerative, and the plant employed was obsolete and inferior. After a year or two of the glorious occupation of spending money like water, these fundamental defects began to tell; the capital expenditure soon reached, in proportion to results, double the estimated figure, the relations between working expenses and revenue rapidly became strained, and the inefficiency of the plant was demonstrated so quickly that within two years after starting the service, the committee, in answer to general complaints of bad service, stated officially that a general change of system was contemplated—a change that has never been made. Since these troubles began to make themselves acutely felt, that is, from about three years ago, when the cranky vessel got fairly into deep water, the Glasgow telephone venture has been kept afloat as best it could until friendly assistance should arrive to tow it into port.

That assistance has now come from a Liberal Government. The price given is a generous one, considering the notoriously inefficient character of the plant and the unprofitable nature of the business, and involves the Glasgow Corporation in a relatively small loss. No secret is made of the fact that the figure has been arrived at by dint of political pressure on the Government departments concerned, and that it is considerably in excess of the Postmaster-General's original offer. This, however, is a minor point. It should not be necessary for the Glasgow Corporation to be convicted of throwing away £150,000 (which is nearer the real loss than £15,000) on an unsound experiment, in order to convince municipal traders that it is unwise to take up and conduct scientific businesses in a wholly unscientific manner. It was truly a poetic touch that last week the Glasgow Town Council, with the usual impatience of discussion which marks telephone debates in the Glasgow council chamber, should straightway proceed from voting the sale of the telephone system to ratifying the acquisition of a municipal sheep farm somewhere in the wilds of Scotland.

THE TRANSFER OF THE HOP EXCHANGE, FROM A TRAFFIC POINT OF VIEW.

By C. W. PIGGOTT.

IT is thought that a few details of the opening of the new Hop Exchange, from the traffic point of view, might be interesting, the transfer being considered the most successful opening of a common battery exchange that has yet taken place.

Some months previous to the opening the details of distribution, the grouping of junctions, training of supervisors and operators, and the mass of detail involved in the transfer of a large junction centre, had been well taken in hand; with the result that every member of the traffic staff was well up to his or her duties.

The first item of importance dealt with was the distribution of subscribers. Records were made and tabulated showing the number of calls for each subscriber during the busy two hours. From these records the distribution was arranged on small charts showing the position of jacks and panels for each answering section, each subscriber being marked according to class of service; as further records were taken the amount of traffic was calculated and tabulated for each position, so that no position was overloaded. All these records were bound in a book which is now very handy for readily ascertaining what subscribers are on each answering section.

The numerical registers were checked with each subscriber from the home sections and these in turn with the multiple, and as new subscribers were joined up these were again checked with the multiple, the home section, and with the chart previously mentioned; so that at the date of opening not a single line was overlooked.

Careful records were taken of subscribers calling frequently at night, and these were distributed within a certain number of positions to facilitate the night work.

A complete chart of the multiple was drawn, showing the auxiliary markings required as well as the necessary service pegs; those subscribers who previously had auxiliary numbers not coming within the same hundred having been induced to change their telephone numbers.

A very heavy part of the work was the training of supervisors and operators by means of a full-sized chart of the new switchboard, showing each class of "A" and "B" positions, and the new lamp cap code; after this, practice was obtained by the courtesy of other exchanges.

An important item dealt with was the re-numbering of the whole of the junctions, both outgoing and incoming, so as to read consecutively.

On the date of opening at 2.30 p.m. word was given to the Maintenance Department that all was ready. Half the junctions were then thrown out of use at the old exchange, being capped with pieces of india-rubber tubing, while the traffic was worked on the second half. The preliminary junctions having been proved with less than the number of faults anticipated, the word was passed by the official controlling the change-over to cut in the subscribers. The signal was immediately given to the clerk-in-charge at the old exchange, and half the operators left the old exchange with their new instruments adjusted and filed in an orderly manner across the road. On reaching the new switchroom each operator walked to the position previously assigned to her and stood behind her chair. At a given signal the operators plugged into their positions and took their seats; simultaneously the little green lamp of the instruction circuit glowed and the word passed to release the relays by plugging into the answering jacks with a switchboard plug. Immediately each operator became busy. Meanwhile the second section of operators was called and, as previously instructed, tested the calling lamps by a short circuit plug, while the inspectors were kept busy proving the remainder of the junctions.

The "no glows" were reported to the section supervisors who in turn reported to the Exchange Manager, and these were again finally tested, after which the faults were handed to the central point to be cleared. The number of "no glows" was 27 or 1·02 per cent., and of "permanent glows" there were 57 or 2·17 per cent. The latter having been plugged up at the testing operator's position on the tone test, the day operators, who had taken a keen interest in the proceedings and had carried out their duties in a manner of which I cannot speak too highly, were enabled to leave, the work being carried on by the usual night operating staff.

The result of the junction test showed 3·6 per cent. of outgoing junctions and 2 per cent. of incoming junctions faulty; and as an indication of the excellent work of the engineers only nine "B" line lamps were glowing.

During the evening tests were made from all parts of London to exchanges obtained *viâ* the Hop, which showed that a satisfactory service was being given.

The exchange is equipped for 3,600 lines, of which 2,631 are working. The outgoing junction capacity is 780 for the "A" boards and 180 for the "B" boards for the lending of junctions, of which 503 are working; while the incoming junction capacity is 33 positions, each equipped with 27 cords, of which 561 junctions are already working. The exchange is an extremely busy junction centre, the major portion of the junction working of no less than sixteen sub-exchanges passing through it.

The supervising staff is eleven, the day operating 87, and the night operating twelve.

The operating floors consist of one subscriber's floor with gallery, which is not in use at present; one junction room in which is equipped a four-position monitor's table; operators' quarters, consisting of dining-room, sitting-room and cloakroom, and a well-equipped kitchen for the cook and staff of two kitchenmaids.

In conclusion, there is no question that the operating, engineering and maintenance staffs are to be congratulated on what is considered to be, as previously stated, one of the most satisfactory transfers that has yet taken place.

THE CONTRACT DEPARTMENTS.

THE Contract Departments are not doing as well as it is hoped that they will do when all hands have had a little more experience in the work. They form a comparatively new departure in the Company's organisation and great things are expected of them. We have had now two annual conventions of Contract Agents, at which all phases of the work have been discussed, many useful suggestions made, and much valuable experience related. It is time that the benefit of these meetings became evident in a higher standard of efficiency. At present the returns from numerous places show relatively unsatisfactory results, and no Contract Department can be picked out as showing a really high quality of work.

There are obvious objections to publishing in detail the actual results of the working of the various Contract Departments, but three tables have been prepared from the May returns which show the relative results, and we shall publish similar tables, and perhaps other useful comparisons, every month in future. District Managers and Contract Agents will find these tables a useful study. Each Contract Agent has his own figures and from these and the comparative figures in the tables he can readily determine exactly the results other places are getting. We hope Contract Agents who find themselves low down in the several tables will at once take measures to ensure climbing to the top.

In Tables I and II the results have been compared with the whole staff employed, including the Contract Agent and the clerical force; all hands are working for the same object, and this seems the fairest means of comparison.

TABLE I.

NEW STATIONS OBTAINED IN PROPORTION TO STAFF EMPLOYED.

Taking Bradford, with highest number, as ...	1·000
Bristol	·960
Manchester	·870
Glasgow	·827
Newcastle	·740
Birmingham	·697
Dundee	·697
Edinburgh	·652
Blackburn	·652
Hull	·652

London ...	·652
Dublin ...	·608
Leeds ...	·608
Liverpool	·608
Aberdeen	·520
Greenock	·520
Nottingham	·520
Brighton..	·435
Belfast ...	·435
Cardiff ...	·435
Sheffield ...	·435
Leicester...	·391
Bournemouth	·348
Plymouth	·348
Portsmouth	·304
Swansea ...	·304
Norwich ...	·273

TABLE II.

NEW REVENUE OBTAINED IN PROPORTION TO STAFF EMPLOYED.

Taking Manchester, with highest new revenue, as	1·000
Bradford ...	·970
Birmingham	·912
Blackburn	·745
Bristol ...	·745
Newcastle	·707
Edinburgh	·684
Liverpool	·684
Dublin ...	·654
Dundee ...	·624
London ...	·616
Leeds ..	·563
Nottingham	·526
Greenock	·526
Leicester	·451
Belfast ...	·437
Sheffield ...	·406
Aberdeen	·368
Plymouth	·353
Bournemouth	·338
Cardiff ...	·323
Norwich ...	·315

TABLE III.

PERCENTAGE OF EXPENSE TO NEW REVENUE ADDED.

Taking Bradford, with lowest percentage, as	1·00
Birmingham	1·14
Manchester	1·17
Blackburn	1·49
Greenock	1·57
Edinburgh	1·64
Dundee ...	1·65
Newcastle	1·74
Nottingham	1·77
Leeds ...	1·78
Belfast ...	1·87
Bristol ...	1·88
Dublin ...	1·90
Liverpool	2·00
Aberdeen	2·03
Norwich ...	2·06
Leicester...	2·07
Sheffield ...	2·19
London ...	2·38
Plymouth	2·64
Cardiff ...	3·25
Bournemouth	3·42

We make no detailed comment on these tables at present. They show a remarkable lack of uniformity in the results at different places of very similar general conditions. It is for District Managers and Contract Agents to discover the reasons for these remarkable differences, and to apply the proper remedies.

PORTSMOUTH MUNICIPAL TELEPHONE ACCOUNTS.

THE Portsmouth Corporation have recently circulated the accounts of the municipal telephone department for the year ending March 31, 1906, and there is much jubilation in the Socialistic Press over the alleged "profit" of £1,849 shown for the year's working.

These accounts are a remarkably good specimen of the special pleading indulged in by town councillors in the endeavour to justify the municipal trading mania, and they illustrate once again the calm disregard of common-sense business methods displayed in the financial management of technical businesses under municipal control. It has become abundantly evident that the municipalities which engaged in the working of telephone systems have underestimated the cost of conducting the business, have fixed rates far too low to be remunerative, and have wasted large sums of money in adopting, for the sake of cheapness in first cost, obsolete plant which shrinks 50 per cent. in value the moment it is put in use. For nearly a year past the five telephone municipalities have been engaged in a frantic struggle to sell out their telephone concerns to the Postmaster-General, and in those cases where the Postmaster-General has been willing to make an offer, that offer has been about two-thirds of the book cost of the plant.

This fact alone should suffice to convince responsible people that there is something fundamentally wrong with municipal telephony. If the municipal telephone concerns were run on their merits as a business, the fact that an expert valuation shows that the capital account has shrunk by at least one-third in value in three or four years of active operations should awaken the municipal telephone committees to a sense of their responsibility, and to the necessity for readjusting the financial management of their enterprises. But to admit even the possibility of error is quite foreign to the principles and practice of municipal trading. The business is shown by competent authorities to be radically unsound; then all the more reason for claiming a large profit. It is shown by the valuation of leading experts that depreciation should have been charged at the rate of about 10 per cent. annually; Portsmouth blandly ignores the experts and ignores depreciation. Portsmouth goes further still, it pays sinking fund and interest on only a portion of the capital, instead of on the whole, and treats such an item as engineer's commission, amounting to £1,860, not as a preliminary expense to be wiped off, but as an asset, subject to no depreciation whatever!

The manner which the "profit" is arrived at is highly interesting. Four general methods are clearly disclosed by a brief examination of accounts: (1) Depreciation is not charged at all; in the original estimate depreciation was provided for at the rate of 2½ per cent., and the Postmaster-General's valuation shows that that rate is much too low; to charge depreciation as originally provided for would make a serious hole in the "profits," as by this time the total depreciation fund, at 2½ per cent., would amount to over £2,200; to charge depreciation at the rate suggested by the Post Office valuation would wipe out the "profits" and leave a large deficit; so the accounts are silent regarding depreciation. (2) Revenue charges are unduly low and capital charges unduly high. The amount charged to line, instrument, and exchange repairs for the year, *i.e.*, for the maintenance of the system, was £1,599, which for a system containing ten exchanges, 2,146 miles of overhead wire, 3,500 miles of underground wire, and 2,475 telephones, is an extremely economical figure. On the other hand, no less than £5,292 was added to capital account during the year, though little new work was done, and it is curious to find that instruments averaged only £2 19*s.* each up to the beginning of the year, but this year cost £5 6*s.* each, while underground work had previously cost only £8 10*s.* per mile of metallic circuit, and in 1905-6 cost no less than £13 19*s.* per mile of metallic circuit. In referring to the Swansea telephone accounts the other day, we pointed out how oddly the extremely low charges for maintenance compared with the relatively large capital expenditure for the year. It would seem that this characteristic feature of municipal telephone accounts has its effect in producing the annual "profits," which must not be absent from those accounts. (3) Sinking fund and interest are paid on but a portion of the capital; there is an overdraft on the city treasurer of no less than £6,930,

and on this sum sinking fund and interest are not paid, while even allowing for this large amount being provided free of interest and sinking fund, the amounts charged against those items still do not respectively work out at 3 per cent. on the actual loan capital. The total at present standing to the credit of sinking fund is £2,538, or just under 5·7 per cent. on the total capital of £44,532, after four years' working. This comparison throws an interesting sidelight on the effectiveness of a sinking fund as a substitute for depreciation. (4) All rentals are treated in the accounts as if paid in full, although the balance sheet shows that no less than £4,494, or over two-fifths of the total annual revenue, is overdue from subscribers. The only offset against this is an allowance of £300 for bad debts. As telephone rentals are payable in advance (and if they are not paid the telephone concern has the simple and effective remedy of cutting off the service) the natural deduction from this remarkable item, which is an annual one and grows annually, is that the Portsmouth Telephone Committee are supplying free telephones to a number of people, but taking credit for them in the accounts as if they were paid for in full.

If due allowance be made for all these various drawbacks, it will be seen that the Portsmouth municipal telephone department, instead of being in the flourishing state which the alleged "profit" is designed to show, is really conducted at a large annual loss. The loss on capital account already amounts to over £10,000, as shown by the Post Office valuation. The actual loss will be much larger than this, as the cost of bringing the system up to date would be more than twice £10,000. The Swansea municipal telephone manager stated the other day that to convert the Swansea municipal system to the Post Office standard of telephone working would cost from £15,000 to £20,000. The Portsmouth system is larger than that of Swansea, so that the cost of conversion to modern apparatus and methods would be greater at Portsmouth than at Swansea. Doubtless the Postmaster-General expects to bear part of the great cost of bringing the municipal telephone systems up to date out of the funds of his own department, though why he should do so is a mystery. All of the expenditure required to reconstruct the municipal telephone systems might have been saved had not the municipalities been obsessed by the idea that the sole feature to be considered in telephone work was extreme cheapness.

What the loss on the annual working of the Portsmouth system amounts to, depends on several factors—depreciation, distribution of expenditure to capital and revenue, and the actual *bonâ fide* revenue. It is impossible to say what the latter figure actually is, as only a serious attempt to collect the outstanding accounts would determine how much of the two-fifths overdue rentals would materialise in cash. However, if depreciation and maintenance costs were properly charged, and interest and sinking fund paid on the full capital, the present annual loss would probably work out at between £4,000 and £5,000.—*Electrical Review.*

CALL OFFICE ROBBERY AT BOLTON.

A PUBLIC call office for local calls was opened in Victoria Square a few years ago, an ordinary instrument and detached automatic box being fitted in a special cabinet provided for the purpose. The cabinet is in a very conspicuous position facing the Town Hall, and is opened and locked morning and night by the constable on duty in the square. The key can be obtained during the night on application at the Police Office in the Town Hall. The installation has proved a success, but the cash box has been too great a temptation to a local youth. Some little time ago it was broken open and the cash taken. The police were requested to watch it closely, but the contents were again removed, together with the lock. It was assumed that the lock was taken in order to procure a key. A careful record was therefore kept of the calls in addition to the regular index. It was not long before money was again missed; a key had apparently been made, as the box was uninjured. It was of the utmost importance that the thief should be found before he turned his attention to other instruments. A plunger contact was therefore fitted in the box, and, by means of a superimposed circuit, connected to a bell in the police office, and arrangements were made for a constable to rush across to the box immediately a signal was given.

The trap was soon successful, as within a few days the alarm was received and a youth found with a key in the lock.

He was brought before the magistrates and bound over under the First Offenders Act to come up for judgment within six months if called upon.

This unfortunately has not proved a lesson to the youth, as he is waiting trial at the Quarter Sessions for the subsequent robbery of a watch from a private house.

"DE-MUNICIPALISATION."

IN the fulness of that wisdom inexperience engenders
Up rose the Glasgow bailies and straightway called for tenders
For a "Corporation perfect-service, wonder-telephone;"
For they said "We'll show 'em how, when we've a system of our own."

"No longer shall the hateful word 'Engaged' assail the ear
The reply of 'Out of order' nevermore shall mortal hear.
The Mighty of the National shall tremble in their seats
And the cable of the stranger ne'er shall nestle in our streets."

A Minister—like Balaam—came down specially to bless
And 'mid blowings of big trumpets, and the plaudits of the Press,
The Corporation system its eventful life began,
The blessings of the call-wire to extend to every man.

Ah! that chosen call-wire system and the blessings in its train,
And the blessing, too, of paying one's subscription o'er again—
For the necessary National of course you had to keep—
Didn't make the wonder-telephone turn out so wondrous cheap.

A charming little profit in each balance sheet they shew
And microscopic sums towards Depreciation go
While large and frequent loans the hopeful Corporation raise
And again the friendly banners wave and friendly trumps sound praise.

A very queer coincidence attention here deserves;
The optimistic profits and the tenuous Reserves—
These strange peculiarities—or Eigentümlichkeiten—
Are likewise seen in Swansea, and in Portsmouth, and in Brighton!

Then hoarse critic-voices whispered that the plant was out-of-date
And the system stationary—"You must sell unto the State!
The National grows daily in favour and in size,
You must sell—or shall we put it—You must De-municip'lise!"

At a loss of fifteen thousand pounds those telephones were sold
But the loss in Moral Damages was greater than in gold
And possibly those Bailies may recoup them in this way:
There will be but one subscription in the coming years to pay.

W. H. G.

TEAM WORK IN OFFICES.

BY A. LYNN, *Chief Clerk, Dublin.*

IT has occurred to me, as I daresay it has to many another who has been called to fill a more or less responsible position in the service, that there is far too much of what may be called working in water-tight compartments in the Company's district offices. This may apply to other branches of the service as well as to the office, but I shall leave that question to someone more competent to deal with the technical side of the business, and the few remarks I may now make shall be confined to the office staff only.

The cashier may be able to count his cash as nobody else in the office could count it, and he may be able to strike his balance in half-an-hour's time and not even cough over it, but I wonder how many cashiers could strike the balance in the Stores Ledgers or issue a Works Order properly.

The cost clerk may be able to tell you that line repairs in the sub-centre have gone up by 2*d.* per station during the half year, and that the railway vouchers coming in so irregularly always swamp his instrument repairs; but it would be interesting to know how many cost clerks could get out the figures for the 149 Form if the wages clerk happened to be laid up at the end of the month.

The outstandings clerk may be in a state of nervous anxiety to keep his percentage figure normal on the finance statement for the first week of the month—and some of them I am sure have a hard tussle to do this—he may spend many a weary hour hunting for that 5*s.* difference between the No. 2 and the Cash Book, but he will get it or know the reason why. When he *has* got it I wonder what he would say, or rather, what he would do, if he were asked to make up the 10*a* Return?

The wages clerk may have his time sheets checked with the Works Order Book and everything in apple-pie order by the Friday evening, and he may be ready to start his No. 4 Return on the

Saturday morning—I say he may do all this, but if he actually performs the feat I would like to shake hands with him, and if he did not know how to set about writing up the Rental Registers in an emergency, I would stay in all night to help him.

I might go on to mention all the different sword-bearers in the district offices, but the JOURNAL has a limit to its space, so I shall let each clerk think the matter out for himself. There seems to be a temptation in district offices for each clerk to plod along in his own little world, heedless of what is going on in the other departments; I think this is a practice which should be condemned by those in charge. If a clerk keeps his eyes open he can pick up many bits of information which, while they may not be of much use to him at the moment, may be a veritable godsend to him later on. Should the cashier happen to see the cost clerk making up his estimates for the month, let him not be afraid to ask "how is it done?" And if the cost clerk has half an hour to spare, it would do him no harm to stand by the wages clerk while he gets out his analysis. The fee clerk may, without going far out of his way, find out how the No. 5 Return is made up; and if he does, let him take a note of it. It will come in useful to him some day, although it may not seem to be of much value at the time.

Something on the lines of operators' "team work" might with advantage be introduced into the district offices; if a clerk is specially rushed with a return due on the 5th of the month, for example, a helping hand might be given him by another whose return is not due until the 15th, of course on the understanding that "one good turn deserves another." Both clerks would benefit and the reputation of the office would not suffer.

I do not mean to suggest that a clerk should leave his own work unfinished in order to acquire knowledge of another man's work. Let him master his own books first—and master them thoroughly—and then, with the approval of his chief, let him look over another clerk's shoulder when he has half an hour to spare. No chief, I am sure, will object to a fellow who, like Oliver Twist, asks for "more."

Overworked clerks may smile at the idea of taking on extra work, and may think I do not know what I am talking about, but I should like to say that I served my apprenticeship in as busy a district office as any clerk could wish for, and very often had to keep on the electric light long after six o'clock in order to keep the work up to date. But at certain periods of the month, when the strain was not so very heavy, I found time to emulate "Wee Macgregor" by asking "Whit wey?"—and all I am sorry for now is that I did not make more use of the little spare time I had.

That others may be able to save themselves like regrets is the aim and object of my few words of advice.

RENTAL REGISTERS AND FAULT CARDS.

BY A. C. GODFREY, *Liverpool.*

THE new pattern (May, 1906) rental registers which are now being supplied are a great improvement in many respects on the old. A subscriber's rental, instead of being posted only to the month in which it falls due, is now posted to the exact due date, as the registers are cut for the days of the month instead of for the months alone.

Such an arrangement tends to make the compilation of the "allocation" sheet of the No. 2 Return a comparatively easy matter, and is much better also for reference purposes, but (and in my opinion a big "but") a very familiar feature, which seemed quite an old friend to rental clerks, is missing. I refer to the "Particulars of Apparatus" and "Length of Line" columns. The elimination of the latter I consider is not of very great moment, but the former is missed and missed badly, and, unless I am very much mistaken, will be still more badly missed as time goes on and installations are altered or reconstructed.

No doubt the designers of the registers gave the matter due consideration before they decided to eliminate these columns from the new books, but the comments I have heard from rental clerks and contract agents (especially the latter) lead me to think that it would have been perhaps wiser to let them remain, if not to extend them.

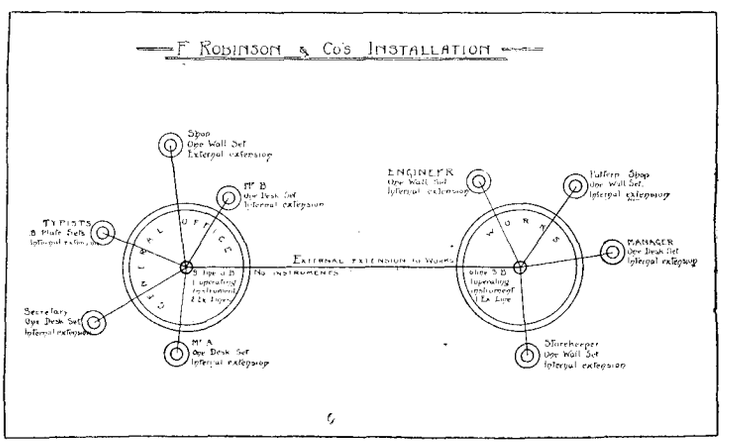
When the new registers were first supplied to Liverpool district at the end of last year, the omission of these columns was taken up with Head Office, who stated in reply that they were not now necessary, as the fault cards contained all the information that the suppressed columns gave, and were to be considered the official record of apparatus fitted at subscribers' premises in future.

With all respect, I propose to give a few reasons which, in my opinion, will show that the fault cards do not fulfil all that is expected of them in this respect.

In the first place, the fault cards are usually kept in an office apart from the district office, which causes delay when a rental clerk wishes to ascertain how a subscriber's rental is made up, *i.e.*, what apparatus is fitted.

Secondly, in the case of large installations, it is usual to show them under a common due date in the registers, and in the old pattern books the subscriber's installation was obtainable at a glance, whereas a separate fault card is made out for each telephone number or station, thus necessitating going through a series of cards and making a summary before one arrives at the total installation.

Our contract agent, a very busy man, as all contract agents are, assures me that the fault cards are the bane of his life in this respect, as he has to refer to them practically every day to deal with subscribers who wish to re-arrange their installations; the old system was, in his opinion, a great saving of time.



Thirdly, the possibility of error is increased by the fact that the fault cards are not, as a rule, posted by men who realise the necessity of absolute accuracy in dealing with such matters; in this district we have reduced the contingency of errors to a minimum, by instructing the inspectors to check each installation with the fault record clerk when making their periodic inspections.

Another phase of this question presents itself in connection with very large installations.

It is a very difficult matter to prepare a statement in regard to an installation, say at a private branch exchange, which has exchange lines, external extensions and internal extensions connected to the one switchboard. In some cases several switchboards are in use, which increases the difficulty. The fault cards in the majority of cases only give the details of the actual instruments fixed, and an extension or tie line between two branch switchboards (terminating on the switchboard at each end) probably does not appear on the card at all. This difficulty has been solved in some districts, I believe, by having a diagram drawn something similar to Fig. 1, which explains itself; this is filed in the electrical department, and is brought up to date when additions or alterations are made; a consecutive number is given to each diagram, and this number is inserted on the fault cards, so that the diagram can easily be turned up when necessary.

The last paragraph in the leader on "The Telephone Engineer" in the second number of the JOURNAL, and the perusal of that admirable article, Telephone Engineering, by Mr. CARTY, induced me to put my impressions on paper (in, I fear, a very crude form) with a view of ascertaining the opinion of other district offices and electrical departments on this question.

CORRESPONDENCE.

REGISTERING CORRESPONDENCE AND FAULTS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

HAVING read with considerable interest the letters on this most important branch of the Company's work, I submit the following suggestions:—

To each letter entered in the Letters Received Book a number is allotted, and this number should be quoted on the reply thereto. Here is a point requiring consideration. I have noticed that while all correspondence from Head Office bears its reference number, the districts do not request that their own reference number be quoted, *i.e.*, the space provided for the reference number is not utilised.

As Mr. Murray, in the July issue, points out, our correspondence may be classified somewhat as follows: -G.M., G.M.(Sols.), G.M.(W/ls.), Secretary, E.-in-C., Stores Dept., P.S., Other Districts, General, etc. I would suggest that a nest of pigeon holes be provided for the various batches of correspondence under these headings, each batch to be kept in its proper pigeon hole as long as the correspondence is pending. When a reply is final, then the correspondence would be placed in the basket "For Filing." A further pigeon hole to be provided, labelled "Awaiting Attention," for correspondence to which, for one reason or another, the district itself has been unable to reply. Of course, it is necessary that the correspondence clerk should send correspondence to the parties dealing with the subject matter; if that correspondence is kept over night, a card should be retained by the correspondence clerk as a substitute for the letter, this card to be placed in the pigeon hole "Awaiting Attention."

Date recd..... Name..... Ref. No.....
From.....
Re.....
Date retd..... ..

Each evening the correspondence clerk should examine the Letters Received Book and be satisfied that either (1) the letter has been replied to, (2) is in the pigeon hole awaiting attention, or (3) that he has a card as a substitute. Periodical examination of this nest of pigeon holes will disclose any laxity in dealing with any particular matter.

Indexing and Filing.—I would suggest that separate indexes be opened for each class of correspondence, and that these indexes be compiled from the batches of correspondence as they are filed the index numbers being, two, the last reference number quoted and the last reference number referred, *i.e.*, the district's own reference number and the correspondent's reference number. If this system were adopted, then, in case of reference at any future time, the enquiring district would be in a position to quote the other district's reference number, thus saving some time, and, more than that, ensuring a prompt reply. Of course the general rules as to indexing would apply, *i.e.*, if a subject had been referred to more than one department an entry would be made in the several indexes, and, while there would be only one filing number, the particular reference number for that department would be quoted.

In regard to the extracting of correspondence from the files, a card to be introduced after the following design:—

Filing No.	Name.	Date issued	Date retd.	Filed as
				Wayleave Agt. Rental Agmnt. etc.

N.B.—One card would suffice for the two accounts by printing on the reverse side of the card.

Whatever system is devised, the indexing and filing are still the key to the whole position Too often this work is left in the hands of an office boy or junior clerk who does not realise the responsibility. In any case constant supervision is necessary, and it would be better to depute this work to an assistant correspondence clerk who is in constant touch with the work. It should be borne in mind that the ability to write shorthand and to manipulate the typewriter does not by any means constitute a correspondence clerk.

Finally, I would have those who dictate the letters bear in mind that in order to enable a correspondence clerk to pay sufficient attention to the supervision of the correspondence of the day, despatching of letters, etc., any typewriting should cease, say at 5 o'clock, and letters after that time (there may be exceptions) should wait for the morrow. E. B. COOPER.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I WAS pleased to see Mr. Dalzell's letter on this subject. If one can judge from the reference column of letters received from other districts there must be quite a number of different methods in vogue. Personally I do not see what is to prevent a system applicable to the smallest as well as the largest district being adopted, and I hope the discussion will be the means of bringing this about. To my mind the system detailed by Mr. Dalzell—and in fact all the systems I have knowledge of as being in use -are too exhaustive. What is required is something simpler, *i.e.*, elimination of detail without loss of effectiveness.

It is the custom in probably most of the districts for a clerk, and in some cases two, to come on duty an hour or so in advance of the arrival of the principals, and although I do not think this can altogether be avoided, the aim should be to reduce the expenditure in this respect. As to how reform is to be brought about I would suggest that the registering of inward letters be dropped. The principle has already been accepted by Head Office in the case of outward letters, for the press copying books served the same purpose as the Letters Received Register does in the case of inward letters. The former proved the forwarding of a communication and the latter the receipt of one, and if a carbon copy is sufficient proof in one case why not the original letter in the other? Apart from this proof the press copying books and the Letters Received Register were consulted in the tracing of any particular letter, but in this respect we have not missed the withdrawal of the former, and I do not think we should be put to any inconvenience if the latter were withdrawn and an index book substituted.

I would suggest the following system:—

(1) All letters originating a subject to be indexed immediately on receipt, subsequent letters on the same subject to be merely attached to the previous papers.

(2) Each subject to have a separate reference number and to be filed in Amberg cases under that number, the number of course to be quoted in the index.

(3) A docket, *i.e.*, a sheet of letter paper of a distinctive colour, to be kept at the top of each batch of papers quoting the reference number and a head-line denoting the matter covered by the papers.

Providing the registering clerk is at all original and can give a good subject headline, there will not be the least difficulty in tracing the numbers of the papers required from the index. If, as is often the case, more than one subject is eventually concerned by the same batch of papers, there is no reason why the docket should not be given a second or third headline and be indexed accordingly. The tracing of papers can also be greatly facilitated by the quoting of the reference number on say, all works orders issued as a result of the correspondence, also on writing off forms, release from contract forms, against rental register and wayleave register entries, etc.

(4) Each department's correspondence can be kept distinct by prefixing a letter to the subject number.

I think that such a system is applicable to all districts, that it would reduce the time spent in preparing the letters for the various departments and principals to a minimum, and would meet the Company's requirements in every way. Once the number is known either from the index works order, writing off form, release from contract form, rental register, or wayleave register, the whole of the papers concerning the matter can be turned up in a few seconds.

(5) Assuming that all cash receipts must be recorded, why not have a separate register? Each post's receipts could then be bracketed together and the cashier's initial obtained. Columns could also be provided, headed cheques, postal orders, stamps, etc., and the amount of each remittance entered under its proper heading or headings. This would save the recording of the description of each remittance, as is customary at present, and would be much clearer.

Bolton, June, 1906. A. N. ENTWISTLE.

INSULATION TESTING.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE most likely explanation of the want of proportionality in the deflections obtained on the insulation test referred to, is that an excessively high resistance exists somewhere in the battery; this may either be due to a faulty connection, or, to the fact that deterioration of the cells (in all probability of the "dry" type) has resulted in very largely augmenting the internal resistance.

Assuming that each wire has a dielectric resistance of one megohm actual, that the battery from some cause offers a resistance equal to 20,000 ohms; also, that the galvanometer resistance is small compared with either, and may therefore be neglected, the *raison d'être* of the peculiarity can be readily seen; for, in the first instance, taking 50 "A's" against 50 "B's," we have the following resistances:—Fifty wires of one megohm each in multiple are = ·02 megohm, battery, 20,000 ohms, total = 40,000 ohms; next take 25 "A's" against the remainder, we have then ·04 megohm + 20,000 ohms, total = 60,000; lastly, sub-dividing again, we have 13 "A's" against the remainder = ·077 megohm + 20,000 ohms, total = 97,000 ohms.

Under such circumstances the deflections obtained would be in the proportions of nine, six and four.

"If 'Sheffield' has in sub-dividing left the "A's" which are not on the testing lead, free, the above will supply a solution, as under such circumstances the sum of the latter deflections should equal the original one; if, however, he has, as should be done, connected them to the earth lead, additional paths for leakage are provided, the current through which would account for the increased deflection." F. D. L.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IN testing the insulation of cables I have got similar results to those described by "Sheffield" when testing the "A" wires against the "B" wires in groups.

If we consider one wire under test for insulation, all the other wires in the cable, with the sheath, being earthed, the insulation round this wire, being surrounded by earthed wires, will be exposed to the full potential difference over all its area, therefore the leakage will be at its maximum.

Now if we put all the "A" wires under test, earthing all the "B" wires, one can easily see that the insulation of one "A" wire will be in contact with the insulation of another "A" wire; as there is no difference of potential at these parts no current will flow through this part of the insulation. This applied to all the "A" wires will reduce the ratio of area of insulation under test to total area, which, of course, will give a false insulation test.

This, I think, explains how the insulation appears to be higher when a large number of wires are tested together. J. HYDE.

Birmingham, July, 1906.

WHAT THE COMPANY IS DOING.

ELEVEN exchanges were opened during the month of July, bringing the total number open up to 1,247. They were: Kibworth (Leicester district), Disley (S.W. Lancashire), Hilperton (Bristol), Foxrock (Dublin), Three Crosses (Swansea), Llanrwst (Chester and North Wales), Wormit (Dundee), Greenhithe (West Kent), Ludgershall (Hants and Dorset), Bolsover (Sheffield), and Ingatestone (Ipswich).

The net increase in stations during June was 4,587, making a total of 386,623.

BRISTOL.—The Bristol underground extension scheme is now well under way. During the past month, three miles of cable of all sizes have been pulled in. Jointing is being carried out day and night by three sets of jointers, and, at a very early date, a large number of new distributing points will be available for new subscribers. The laying of pipes to the Stoke Bishop and Westbury Sub-Exchanges has been completed, and the cable ordered for these sections; and as soon as this latter arrives, it will be drawn in. As regards the Central Exchange, only two miles 1,687 yards of cable still remain to be drawn in, and of this amount two miles 740 yards are to replace cable of smaller capacity. The work of adding 500 multiples and answering jacks to the Bristol common battery board is nearing completion, and building operations are in progress for the extension of the main frame to accommodate 1,500 additional lines; the frame will then accommodate 6,300 lines. An observation table for service testing has been brought into use.

LEICESTER.—A transfer board consisting of 400 P.L. multiples and 28 junctions—lamp calling and clearing—has been fitted at Leicester Central.

WALSALL.—At the Walsall Exchange in the North Midland district, structural alterations for the necessary enlargement of the switchboard and testroom are in progress. The new switchboards have been supplied and are in progress of being erected.

GREAT MALVERN.—An extended scheme of underground work laid through the principal thoroughfares of this town is nearing completion.

CRADLEY.—About 1·6 miles of single pipe have just been laid.

HANLEY.—The Company has recently been withdrawing all the old cables from the centre of Hanley and substituting for them large size 10-lb. cables. Lengths of 600, 400 and 300-pair cables have been substituted for the old cables in the centre of the town, and several new distributing poles have been erected. The work of withdrawing the old cables was carried out in each case at three consecutive week ends, the subscribers being disconnected for the greater part of Sunday. No hitch whatever occurred, everything going very smoothly. A new main cable between Hanley and Stoke is now on requisition, and this will probably be drawn in next month.

THAMES VALLEY DISTRICT.—A section of underground cable has been laid at Englefield Green, near Egham, in smart time; 1,350 yards of trench (two feet deep) was opened, pipes laid, 25-pair cable drawn in and jointed, ground filled in again and turf replaced, in eight days. The whole job was carried out by the Company's own men.

LONDON.—A private branch exchange was opened at Waterloo Residential Chambers, Jermyn Street, on the 12th inst., with seven exchange lines and 80 extensions. The service is available continuously (Sundays included). A private branch exchange was opened at the Charing Cross Hotel on July 26 with 303 stations. The service is available from 8 a.m. until 12 midnight (Sundays included).

Operator's School.—The work in connection with the installation of the common battery sections for the operator's school at London Wall has been completed.

GRIMSBY.—The common battery equipment for 700 lines has been completed and was brought into use on July 21.

NOTTINGHAM.—The specification is at present in hand for the extension of the common battery switchboard for about 2,000 lines.

SCARBORO'.—The work in connection with the installation of the common battery equipment for 600 lines has been completed.

BIRMINGHAM.—The underground work necessary in order to open the new exchanges at Aston, Edgbaston, Selly Oak, Moseley, Handsworth, and Small Heath has now been completed. Additional underground branches have also been laid to various new distributing poles.

NEWS OF THE STAFF.

Mr. E. J. JARRETT, Local Manager, Sunderland, has been transferred as Local Manager, Dublin, in place of Mr. F. G. Hives, who remains at Reading. Mr. Jarrett entered the Company's service in February, 1891. After being a wayleave officer at Newcastle he was made Local Manager at Sunderland in June 1899.

E. SPINK, Local Manager, Scarboro', has been promoted to be Local Manager, Sunderland.

W. CASTLETON, Inspector-in-Charge, Beverley, has been promoted to be Local Manager, Scarboro'.

Mr. C. S. WOLSTENHOLME, on leaving the East Kent district to take up the position of Chief Engineer at Liverpool, was the recipient of a meerschaum pipe, together with a complete shaving outfit.

Mr. N. L. BLOCKLEY, late of the Engineer-in-Chief's Department, who has now joined the British L. M. Ericsson Company, was on Saturday, June 30, presented with a handsome combination spirit and cigar cabinet on behalf of his late colleagues. The presentation was made by Mr. Gill, who expressed his regret at losing Mr. Blockley, who had acquired considerable experience in the apparatus used by the Company. Mr. Gall, on whose staff Mr. Blockley had been for over ten years, wished Mr. Blockley every success in his new appointment.

Miss H. ADAMS, Senior Supervisor, Dundee, has resigned her position in the service and gone to Winnipeg to take up a position in the telephone service there. Before leaving she was presented with a purse of sovereigns as a token of goodwill and good wishes from the members of the staff.

Mr. A. E. BARNES, Nottingham factory, was on June 30, 1906, presented with a serviceable kit bag on the occasion of severing his connection with Notts factory, prior to emigrating to Canada.

Mr. E. D. SHAW, Inspector, Portsmouth, resigned to take up a position in the Bengal Telephone Company, Calcutta, for which he sailed on June 2, 1906. Mr. Shaw entered the service in March, 1893, and served the Company in Southampton, Brighton and Portsmouth districts.

Mr. E. S. FRANCIS, the Chief Electrician of the Liverpool district, was married on June 2, at Brantham, Essex. He was the recipient of a handsome marble clock and barometer presented by the district staff generally, and of a rose bowl subscribed for by the Royal Exchange staff.

Mr. J. L. MCGRATH, Contract Agent, Edinburgh, was on Thursday, July 19, presented with a congratulatory gift by his staff. The occasion was the first anniversary of the opening of the Contract Department at Edinburgh. It may be of interest to state that the department has been instrumental in securing a nett gain of 1,268 new stations in the district.

Mr. F. MILWARD SMITH, Local Engineer at Kensington, was married at Bridlington on June 5, to Miss Mabel Henderson, the youngest daughter of the late Rev. J. Wilson Henderson of Bridlington. He was presented with a writing bureau by his colleagues.

Miss E LA ROCHE, Senior File Clerk of the Correspondence Department, Salisbury House, London Wall, left the Company's service on June 28, in view of her approaching marriage. Previous to her leaving, she was the recipient of a handsome copper kettle and spirit lamp and a cake stand, subscribed for by the members of the staff in the department and by those with whom she had worked in the late southern district.

Mr. FRANK KITCHEN, Assistant Cashier, Manchester, was married to Miss EDWARDS of the Operating staff on June 14, 1906. Prior to leaving the Company's service Miss Edwards was presented with a dinner and tea service and sundry other mementos by the Operating staff, and Mr. Kitchen with a marble timepiece, suitably inscribed, as a token of the esteem and good wishes of his colleagues in the district office.

Miss KATIE CAMPEY, one of the Senior Operators in Leeds Central Exchange left the service on July 12, to prepare for her marriage, which takes place on the 21st of that month. A handsome timepiece was presented to her, as a mark of esteem from the operators.

Miss A. APPLEYARD, Leeds, resigned the service on July 12, as she is going to reside in British Columbia. She carries with her the best wishes of her late colleagues.

Mr. PRICE, Stores Clerk, and Miss L. PRITCHARD, late Cost Clerk, Southampton, were married on July 21. Miss Pritchard, who had been seven years in the service, was the recipient of a present from her colleagues.

Miss G. KIRK, Senior Operator, Belfast, has been presented with a case of cutlery by the members of the staff, on the occasion of her leaving the Company's service to be married.

Mr. H. H. KILBY, of the Midland Superintendent's office, was presented by the Birmingham district staff with a barometer on the occasion of his marriage last month.

Mr. THOS. J. EARLY, Chief Clerk, Dublin, was married on July 10 to Miss Agnes M. Williamson, also of Dublin. He was presented by the district staff with a silver afternoon tea service, and by the Superintendent's Office staff with a framed picture. Mr. Early was previously Chief Clerk in the Superintendent's office.

Miss THOMPSON, Nottingham Central Exchange, who has resigned in order to be married, has been presented with a china tea service by the Operating staff.

Miss ALLEN, operator, Longton Sub-Exchange, recently left the service to be married. The staff subscribed for a wedding present, which took the form of a travelling trunk.

Mr. F. J. P. BLYTH, Inspector, previously stationed at King's Lynn, has been transferred to Peterboro' as Resident Inspector.

Miss L. D. CAPLE, Correspondence Clerk in the Cardiff local office, who left the Company's service on July 14, was presented by members of the staff with a gold-mounted umbrella.

Miss C. HOARE was presented with a silver brush and comb on leaving the Company's service, July 21, to enter into a private business. She was engaged in the Portsmouth district at the time it was formed in 1901, and filled the position of Correspondence Clerk to the District Manager.

Mr. E. ROWAN was presented by the past and present members of the Head Office Travelling Audit staff with a marble clock on the occasion of his marriage.

Miss HARTLEY, Supervisor, Hull Exchange, resigned to be married; and Miss BARRICK, Senior Operator, Hull Exchange, promoted to Supervisor. On the occasion of her marriage, Miss Hartley was presented with an oak table by the staff of the Switchroom and Trunk Fee Department.

London Traffic Department.—*Promotions and Transfers for July.*

Miss R. WARE, Senior Operator, Avenue, to be Supervisor, Hop Exchange.

Miss A. BULL, Senior Operator, Kensington, to be Supervisor, London Wall Exchange.

Miss A. JAMES, Supervisor, London Wall, to be Supervisor, Hop Exchange.

Miss E. MCLEOD, Operator, Kensington, to be Exchange Clerk, Kensington Exchange.

Miss A. BRAND, Operator, Bank, to be Supervisor, North Exchange.

Miss H. LEWSEY, Operator, Paddington, to be Monitor, Westminster Exchange.

Resigning to be married:

Miss M. HACKER, Supervisor, North Exchange.
Miss V. HOLDER, Supervisor, Hop Exchange.
Miss D. BURDGE, Operator, Holborn Exchange.
Miss R. COLLINS, Operator, Gerrard Exchange.
Miss A. DAWKINS, Operator, Hop Exchange.
Miss M. JOYCE, Operator, Avenue Exchange.
Miss G. LAMPLOUGH, Operator, London Wall Exchange.
Miss A. LEATHERDALE, Operator, London Wall Exchange.
Miss G. PURCELL, Operator, Gerrard Exchange.
Miss E. STAGG, Operator, Holborn Exchange.
Miss P. TRAYLER, Operator, East Exchange.

Mr. F. GROVE, Exchange Manager, Bank, was married on the 18th inst., at St. Matthew's Church, Wandsworth Bridge Road, to Miss D. GODFREY, late Supervisor-in-Charge of Richmond. Mr. Grove was the recipient from the Traffic and Maintenance staffs (including the Bank Operating staff) of a marble clock, silver-mounted butter dish and knife, and plated toast rack, and Miss Godfrey of a case of fish knives and forks from the Richmond Operating staff.

STAFF GATHERINGS.

Swansea.—On June 30 the indoor staff of the Swansea district held their annual picnic. This year the venue was Pont-Neath-Vaughan. Immediately after tea the party were photographed, and then wended their way to the falls, where a brief but enjoyable time was spent. Neath was reached on the return journey at about 9.45, and Swansea about 10.30. The same day, but starting at 10 a.m. from Swansea, the National Telephone Company's engineering line and labour staffs went to Llandilo. Lunch and tea were partaken of at the White Horse Hotel. The football field had been kindly placed at the staffs' disposal for sports, etc., which took place during the day. Amongst other events, Mr. Geo. Thomas won first prize in the long jump contest, and Mr. T. Mabbett first for flat racing.

Norwich.—The indoor staff of the National Telephone Company, Limited, comprising the staff of the East Coast district offices and the Norwich local offices, had their first outing of the season on June 23. The party engaged the motor-boat "Doris," and journeyed to Coldham Hall, where tea was excellently served. A capital programme of sports was carried out.

Warrington.—The staff of the South-West Lancashire district held their annual picnic on Saturday afternoon, June 30, congregating from the various centres at St. James Station, Liverpool, and journeying to Leasowe Castle, in the Wirrall Peninsula, about equi-distant from both New Brighton and Hoylake. Between 50 and 60 members, representing all branches of the service, attended, and a very enjoyable afternoon was spent. A sports programme was introduced for the first time and was much appreciated, there being races for both ladies and gentlemen, with suitable prizes provided.

Birmingham.—An exceedingly pleasant afternoon was spent on the banks of the Severn, at Arley, on Saturday, June 23. About 70 members of the Birmingham and district staff sat down to tea, under the chairmanship of Mr. R. U. Tucker, Chief Clerk, who referred to the success due to the organisation of Messrs. J. S. Rhodes and H. E. Waterhouse. Messrs. Spiers and Comyn supported the chairman in his remarks.

Hanley.—The annual picnic of the members of the staff of this district took place on Saturday, July 7, and was very well attended. An excursion was made to Rudyard Lake, where tea was served. Everything went off very satisfactorily.

Dublin.—The staff picnic to the Scalp, co. Wicklow, which was postponed from June 16 will take place on Saturday, July 28.

Walsall.—The Walsall staff of the North Midland district held their first annual picnic on Saturday, June 30. They were joined by several of the Wolverhampton staff and drove by *char-a-banc* to Brewood. Mr. R. S. Grosvenor, Inspector-in-Charge, Walsall, very successfully conducted the party, and the outing turned out thoroughly enjoyable.

Metropolitan Staff.—A launch trip has been arranged to take place on August 11, from Kingston to Weybridge by the "Princess Beatrice." The boat will leave Kingston about 3.30 p.m. arriving soon after 5 p.m. at Weybridge where tea has been arranged for at the Holnstein Hall which has excellent accommodation in the grounds for a large party. The boat will leave Weybridge so as to arrive at Kingston Bridge about 10 p.m. The train fare from Waterloo to Kingston return is 1*s.* 6*d.* (reduced price), and the fare for the launch trip is 3*s.* Applications for tickets should be made early by those wishing to participate, as the number is limited to 150. Information and tickets can be obtained from Mr. Knapman, Salisbury House, and Mr. Hayward, Battersea office.

Glasgow.—The annual cruise took place on the evening of Monday, July 9, when the staff and friends, to the number of 470, enjoyed a very pleasant evening's sailing. At Gourock, which was reached by rail, the company joined the Caledonian steamer "Ivanhoe," specially chartered for the occasion, and to the accompaniment of vocal and instrumental selections proceeded up Loch Long towards Arrochar. The weather conditions were favourable.

Cardiff.—The account of the district staff outing last month should have stated that the Cardiff team were victorious and brought home the shield.

Nottingham.—The annual outing of the Nottingham members of the local and district staffs was held on Saturday, June 23. A brake party numbering about 30 journeyed to Plumtree, a picturesque village near Nottingham, where under delightful weather conditions a most enjoyable afternoon was spent. A cricket match was played between teams chosen from the local and district staffs, the local staff gaining an easy victory. The scores were: District staff, 39; Local staff, 144 (V. E. Lane 41, H. Saywell 53, not out). Afterwards an excellent tea was partaken of.

Bristol.—On Saturday, July 7, a large number of the office and instrument staffs accompanied by wives and friends once again journeyed to Abbots Leigh, a delightfully pretty old-world spot on the Somersetshire side of the winding Avon. As on previous occasions the ramble culminated in a most enjoyable picnic and cricket match. As at the previous meetings the office won, and of the 61 runs made, Mr. E. S. Cooper contributed 38 before being run out. The instrument staff were disposed of for 27 runs, Mr. Stowell did good work by taking five of the office wickets for six runs.

Dundee.—The Dundee staff held their annual picnic on Saturday, July 14, when to the number of about 80 they drove to Redmyre Loch which is beautifully situated among the hills about ten miles from the city. On arrival there tea was served, after which the usual picnic fun was indulged in, and football, foot-racing, tug-of-war, and other forms of healthy exercise were all well patronised. Before leaving the prizes won in the various events were presented by Mr. A. Mackenzie, Local Manager.

Southampton.—The Hants and Dorset district staff arranged for an outing on June 23, when representatives of the staff from Southampton, Bournemouth, Weymouth, Salisbury and Winchester, numbering 56, met at Brockenhurst where a most enjoyable afternoon was spent. A cricket match was arranged between the Southampton staff and the remainder of the district, the former winning by 21 runs. The District Manager made this the occasion for presenting certificates of proficiency in technical classes to the successful students, *i.e.*, E. Harper, Local Manager, Bournemouth; J. T. Bianchi, Local Manager, Salisbury; T. F. Reeves, Inspector, Southampton; and V. Smith, Instrument Learner, Southampton. A tug of war was arranged between the ladies of the Southampton and Bournemouth staffs, in which the latter were successful, and another between male staffs in which Bournemouth were again the victors.

Sheffield.—A drive to Strines (under most favourable weather conditions) took place on Saturday, June 30. The staff left at 2 p.m. and returned at 8.30 p.m. tea being provided at 5 p.m. A social and outing club has been inaugurated in Sheffield, 80 per cent. of the entire staff becoming members. The club is of too recent formation to permit of advantage being taken of its funds during the present year for an outing, but a social gathering will be held later on.

Leeds.—*Cricket.*—On June 30, a team representing the East Yorkshire district journeyed to Leeds to play a team representing Mid-Yorkshire district. After a very pleasant game East Yorkshire proved much the better side, scoring 68 to their opponents' 36. For the East Yorkshire district Hunter played very well for 20, and was well supported by Vickerman, 14, and Nicholson 13. Vickerman also took 6 wickets for 14 runs. For Mid-Yorkshire, Blackburn was the only one to make a show, scoring 19 not out, and taking 9 wickets for 30 runs. After the match the visitors were entertained to tea at Roundhay Park Mansion by the home team.

Hull.—A successful picnic of the Hull Exchange staff was arranged and took place on Whit-Monday, the destination being Chatsworth and Haddon Hall. The weather was all that could be desired, and everyone agreed a most enjoyable day had been spent.

Edinburgh.—A picnic was held by the Edinburgh district staff on Saturday, July 7. The company, numbering over 100, including Mr. Stewart, District Manager, and Mrs. Stewart, drove in *chars-a-banc* to Carlops, about fifteen miles distant, where tea was provided and outdoor games engaged in. In the evening local showers made the company seek shelter, but the homeward drive was accomplished under more favourable climatic conditions. The excursion was very successful and enjoyable, and it is hoped such a gathering may become an annual event.

Notts Factory.—With a view to the formation of an athletic club, a swimming section has recently started, and has a membership of 80 up to the present. This number it is hoped will be greatly increased when the club gets into full swing. Advantage is being taken of the facilities offered for swimming; the bath, which is 110 feet long and 35 feet wide, being one of the finest in the country. In addition to the above, if the committee are able to obtain a suitable ground, a football club will be started, friendly matches will mostly be played by both the senior and junior teams, but the cups and shield, which are open for competition, will, no doubt, be competed for. Further particulars will be announced in a later issue of the JOURNAL. The annual outing of the factory employees will take place on August 18, when Bottesford will be visited. With sports and a good meat tea it is hoped that an enjoyable afternoon will be spent by the 150 who have promised to go.

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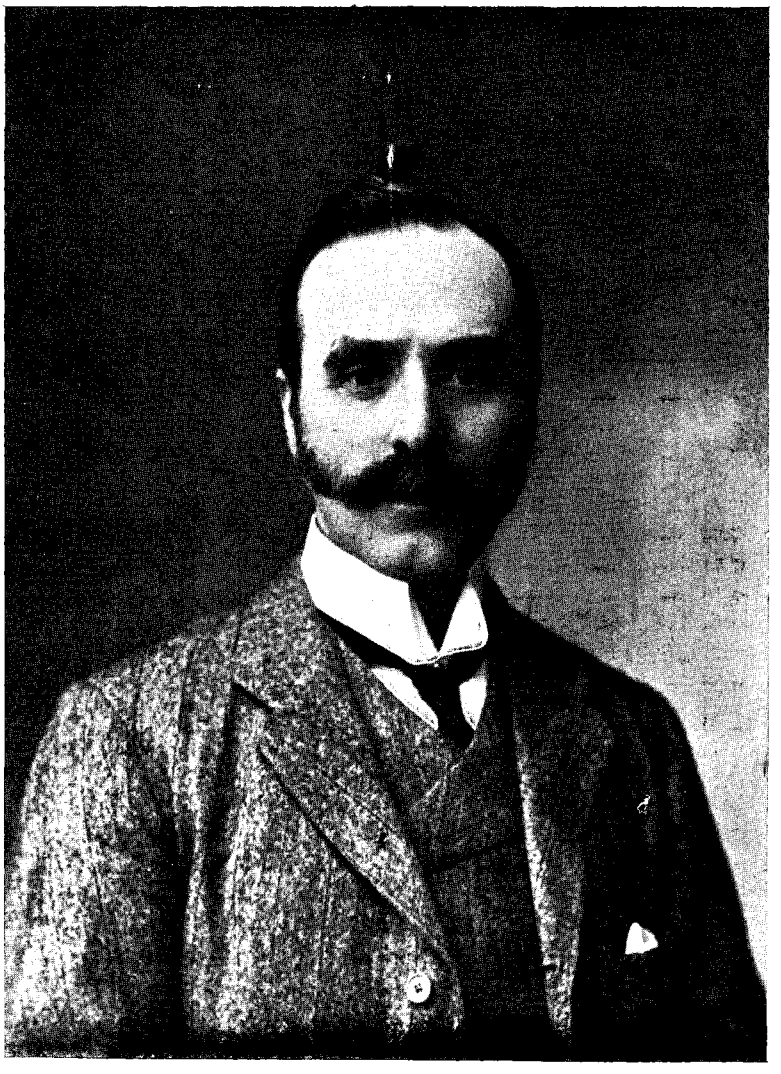
TELEPHONE MEN.

IV.—DANE SINCLAIR.

MR. SINCLAIR was born in Caithness, N.B., June 6, 1852, and began his electrical career in the Telegraph Department of the North British Railway, in Scotland, which he joined in 1872.

In 1875 he was selected to join the service of the Japanese Government as a telegraph engineer, and he served in that country for five years. Mr. SINCLAIR always describes this time as the happiest five years of his life. In recognition of his services to the Japanese Government the Mikado, in 1899, conferred on him the Order of the Rising Sun of the Third Class, this being the highest order which it is possible for the Japanese Government to confer on anyone who is not a Japanese subject. Mr. SINCLAIR's experience in the construction, maintenance, and working of telegraphs in Japan prepared him for the varied experience he has had since his return from that country in 1879.



After returning from Japan Mr. SINCLAIR joined the Dundee and Arbroath Joint Railway, and was put in charge of the Telegraph and Stores Department; although only there for about two years, he left his mark on the railway service by the introduction of a small invention in connection with railway wagons, which effected a considerable saving to the railway company, as well as, we believe, proving remunerative.

In 1882 Mr. SINCLAIR was appointed Engineer to the National Telephone Company, Limited, for the Glasgow district, and shortly afterwards became Electrician-in-Chief to the Company. This was in the comparatively early days of telephony. The experience he had already gained in the telegraph world helped him considerably in the construction of the telephone plant which now came under his charge.

On the amalgamation of the three principal Telephone Companies of the country, viz., the United Telephone Company, the Lancashire & Cheshire Telephone Company, and the National Telephone Company, Mr. SINCLAIR was selected by the Directors of the amalgamated Company to examine and fully report on the plant and management of the telephone system of the Metropolis, and on the basis of his report the re-organisation of the system was carried out; and he was, under the re-organisation, appointed London Manager.

In June, 1892, he was promoted to the position of Engineer and Electrician-in-Chief of the entire system of the National Telephone Company.

In 1896 Mr. SINCLAIR was appointed to act with Mr. GAVEY in the valuation of the Trunk Line system, which had been sold to the Post Office. This was a work which required a considerable amount of care and attention, and much travelling. The drive along the roads from Plymouth to Aberdeen, and through Ireland from Dublin to Belfast, covered a distance of 34,000 miles, and occupied in all nearly a year. The outcome of the valuation was satisfactory both to the National Telephone Company and to the Government.

During the time Mr. SINCLAIR served the National Telephone Company as Engineer-in-Chief, viz., from 1892 to 1902, he had a large work carried out in the way of standardising all the materials used by the Company, and, as was lately remarked at one of the National Telephone Company's annual staff dinners, helped to lay the foundations upon which the present engineering practice is based.

In 1902 Mr. SINCLAIR left the National Telephone Company's service to join, as General Manager, a new company that had been formed by the amalgamation of the British Insulated Wire Company, Limited, Prescot, Lancashire, and the Telegraph Manufacturing Company, Limited, of Helsby, now known as the British Insulated & Helsby Cables, Limited, of Prescot, Helsby, etc.

He still occupies the position of General Manager of the British Insulated & Helsby Cables, Limited, and although his interests are not now purely telephonic, he by no means ceases to take a lively interest in all matters appertaining to telephony. His long experience has useful application in the manufacture and supply of telephone cables, switchboards and instruments, and other accessories required in the telephone business, and each year Mr. SINCLAIR'S presence at the staff dinner of the Company is looked forward to by a number of his old colleagues.

Mr. SINCLAIR is an old golf player, and we believe that it would be correct to say that only on the golf course is it possible to prevent him from talking "shop" in a more or less degree.

He is an ex-member of the Council of the Institution of Electrical Engineers, and has written several papers for the Glasgow Philosophical Society, of which he was a member of the Council. Some time ago he published in the *Electrician* a series of papers on "Improvements in Telephony in Scotland."

INEFFECTIVE CALLS.*

By W. NAPIER.

"IT should always be borne in mind that a subscriber does not know what is taking place at the operator's end of the line, and through a want of knowledge rather than from an intention to say that which is not true, he is frequently led into making statements that are not always in accordance with the facts of the case." This statement will be found on the first pages of all books of operating regulations issued by the General Manager.

A short time ago a certain subscriber called for his own number. The operator in the usual way tested the number on the multiple and replied "Number engaged." The subscriber stated that it was his own number he had called for, and this just proved that the operators were a pack of liars, that his number could not be engaged. The explanation is that operators do not of course examine the numbers on the answering jacks, and are frequently not aware of the caller's number. It was explained to the subscriber that his calling and being answered by the operator at once engaged his line, but he said that operators were liars, and he appeared to think it a serious matter.

The operator in the case in point replied correctly and according to the routine laid down by the Company, though it is easy to see that such an incident would create a totally wrong impression on anyone unfamiliar with the multiple board.

Quite recently one of the Company's officers made a similar report to me, minus the bad language. He had called for the number of the instrument he was speaking from and could not see why the operator should reply "Number engaged."

Two essential points in the production of good telephone service are:

Absence of the reply "Number engaged" and absence of the reply "Don't answer." The expression used should not be "*Won't* answer," as this implies to a certain extent that the party called can but *will not* reply.

It is obvious that an entire absence of ineffective calls is impossible, but it is equally obvious that there must exist means whereby the proportion of such calls can be reduced.

It is clear from Fig. 1 that the ineffective calls, that is, calls in which operators answer, take the number required and do more or less further work, but cannot complete the connection or cannot obtain a reply, represent a very large fraction of the total work done. In fact no less than 22·3 per cent.

What applies to Manchester in this respect applies to a large extent to other towns throughout the country, varying no doubt according to the traffic and the system of working.

In the diagram I have plotted two lines, "A" and "B," "A" being total calls, effective and ineffective, "B" being effective calls only.

The shaded portion, therefore, represents the waste. "C" probably shows the proportion more clearly. Allow that the work in dealing with an ineffective call is equal to ·75 of that on an effective call, it is clear that in an exchange where the wages run to £100 per week the loss to the Company through operators having to deal with ineffective calls must be ·75 of £22 6*s*. 8*d*. or £16 8*s*. per week. Therefore, if the ineffective work can be wiped out a corresponding amount of effective or productive work will be done instead. In addition to the operator's time, there must, of course, also be taken into consideration the wear and tear on cords, keys, signals, jacks, instruments, etc., and the waste of current; and in the background there is the correspondence arising from complaints. By decreasing the percentage of ineffective calls, beyond satisfying subscribers, there is a distinct money gain to be made.

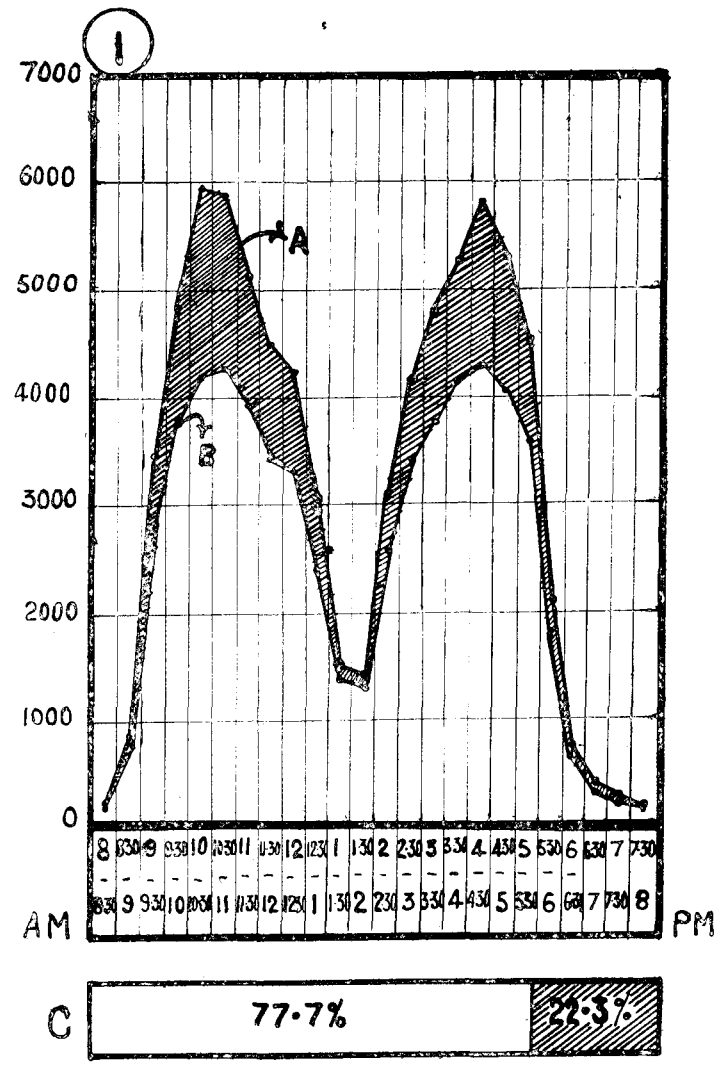


FIG. 1.

The proportion of ineffective calls is admittedly high. This results in an uneconomical and an unsatisfactory service.

I contend that much more can be done outside the switchroom than in it to reduce the trouble.

The points for consideration are:

(1) Subscribers should have a sufficient number of lines to carry their traffic effectively.

(2) It is essential that careful attention should be paid to the necessity for giving the clearing signal to exchange on the completion of each call. In all cases both calling and called subscriber should clear.

(3) If it is found necessary during a conversation that a considerable time must elapse before a reply can be given to terminate the business in hand both subscribers should clear their lines and, when ready, originate a fresh connection. In other words subscribers should not hold their lines "engaged" needlessly.

(4) Responsible individuals or trained operators should be employed by subscribers to use their telephones. The

* Abstract of a paper read before the Manchester Telephone Society, April, 1905.

prevailing method of handing over this important work to the junior office boy is out-of-date and altogether inefficient.

(5) Telephone engineers and experts of to-day look to improved systems and thoroughly reliable signals to reduce the ineffective calls. The portion which the operators can control comes far down in the list of remedies.

Referring to Fig. 2, it is evident that ineffective calls vary in proportion according to the class of subscriber called and the time

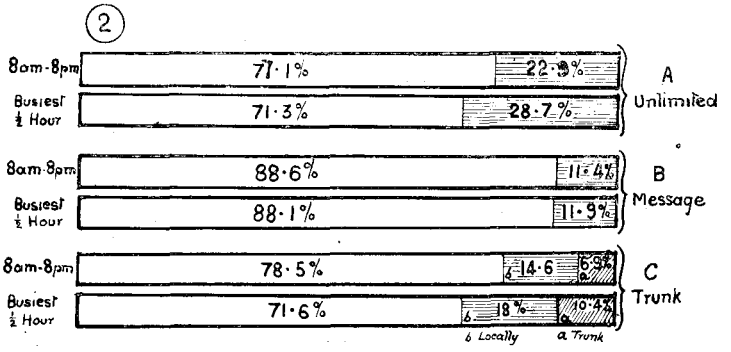


FIG. 2.

of day. The record was taken on March 28, 1905. "A" shows that on an average 22·9 per cent. of calls to flat rate lines were ineffective, but in "B" it is shown that with message rate lines only 11·4 per cent. are ineffective. "C" shows applications by Post Office for trunk calls. I should here point out that it is much more work in Manchester for an operator to connect to a message rate line than to a flat rate, on account of the fact that connections to message rate numbers all pass through transfer junctions. This point is worth the consideration of those who think that operators gain something by replying "engaged."

The real cause of the difference is, of course, that message rate lines are used by the smaller firms as a rule and are less frequently and more discriminately used. Therefore the chances of getting them when required are much greater.

For a directly opposite result take a busy flat rate subscriber. In Fig. 3 is shown the result of two hours' careful observation made on the two lines of a railway company, designated "A" and "B."

The diagram is divided off into minutes (120) and the horizontal lines represent the duration of each connection. The continuous lines are inward calls, and the dotted lines outward calls. It is evident that nearly all the connections were inward, being probably enquiries regarding goods and deliveries. The individual dots represent ineffective calls.

It is noticeable that a very large number of the ineffective calls were made within a very short period, 11.45 a.m. to 12.30 p.m. Follow the case of "*c*"; I am sure he will have your sympathy and deserved the connection he got at 12.49 p.m.; "*d*" fared better because he called at shorter intervals.

These particulars were taken specially, and carefully observed with a stop watch, on account of a complaint from the said railway company to the District Manager, stating that the public had difficulty in getting them.

The diagram was prepared later. It illustrates very fairly what occurs daily on the lines of railway companies and other busy concerns.

The Manchester service inspector on March 15, 1905, called on a subscriber regarding a complaint. In his presence the subscriber booked at one time eight trunk calls, as follows:—

458	Oldham.
144	,,
54	,,
32	Littleborough.
137	Rochdale.
11	Ratcliffe.
15x	Heywood.
52	Elland.

That subscriber now has an auxiliary line.

A special record of ineffective calls was made during a half-hour on a Saturday morning.

The total number of times the reply "engaged" was given during that half-hour was 2,286.

A feature of this record was the unequal distribution of the ineffective calls.

Out of 6,800 lines on Manchester Exchange, only 1,008 were concerned, as follows:—

For	5,792	subscribers	no call	made	when engaged.
,,	535	,,	1 ,,	,,	,,
,,	206	,,	2 calls	,,	,,
,,	111	,,	3 ,,	,,	,,
,,	57	,,	4 ,,	,,	,,
,,	38	,,	5 ,,	,,	,,
,,	19	,,	6 ,,	,,	,,
,,	9	,,	7 ,,	,,	,,
,,	6	,,	8 ,,	,,	,,
,,	10	,,	9 ,,	,,	,,
,,	4	,,	10 ,,	,,	,,
,,	2	,,	12 ,,	,,	,,
,,	3	,,	13 ,,	,,	,,
,,	1	subscriber	14 ,,	,,	,,
,,	1	,,	15 ,,	,,	,,
,,	1	,,	19 ,,	,,	,,
,,	2	subscribers	20 ,,	,,	,,
,,	2	,,	25 ,,	,,	,,
,,	1	subscriber	32 ,,	,,	,,

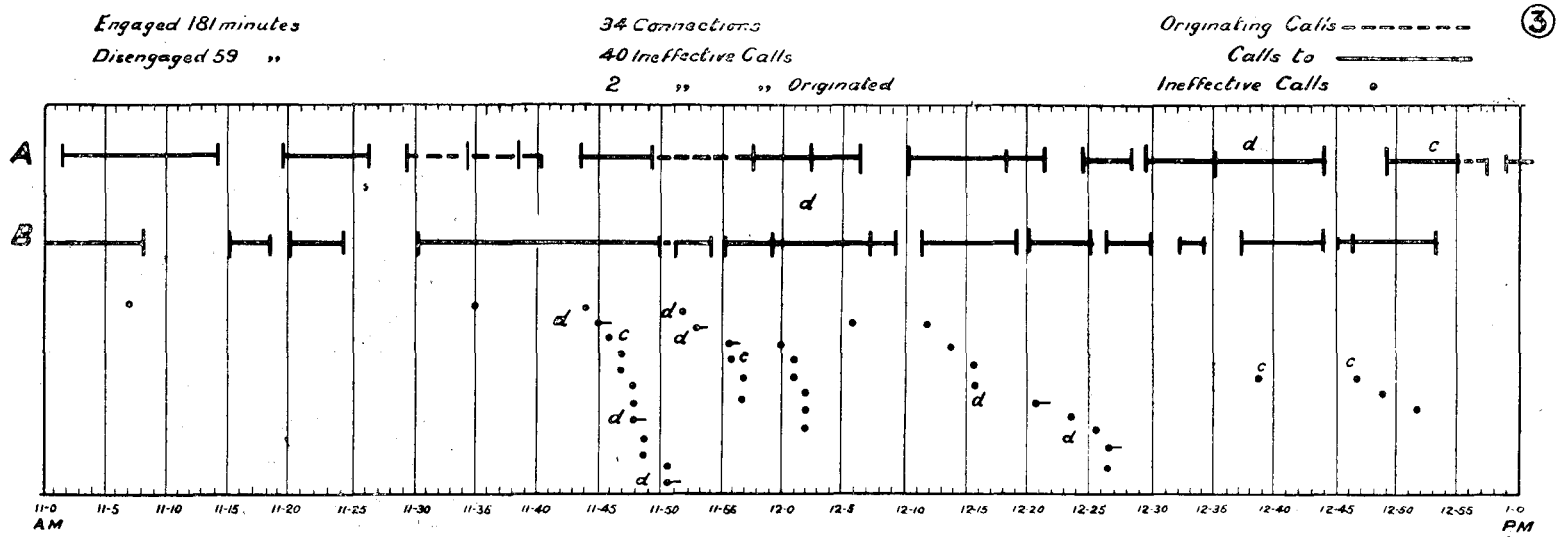


FIG. 3.

If we deduct the cases in which from one to three calls were made for the same number, we have 1,006 calls for 146 subscribers. Further, we find that 778 applications were concentrated on 99 subscribers; an analysis of the lines in such demand is as follows:—

	No. of firms.	No. of ineffective calls.
Railway companies, railway companies' agents, carriers and canals	12	147
Retail merchants and manufacturers ...	5	67
Engineers	8	75
Wholesale chemists and oil merchants ...	3	37
Timber importers and merchants... ...	4	35
Wholesale merchants, provisions, fish and poultry, corn, etc....	7	46
Corporation	1	13
Cloth and yarn merchants, agents ...	9	62
Shippers and packers	8	55
Calico printers and spinners, bleachers, finishers	18	113
Insurance companies	1	6
Brewery companies...	1	5
India-rubber manufacturers	3	16
Infirmary	1	7
Abbey Club	1	7
Company's enquiry department	1	6
Printers, stationers and paper manufacturers	3	16
Coal merchants	1	5
Solicitors, surveyors and valuers	5	26
Others	—	11

It is the custom of many subscribers to call up the supervisors when they have been informed several times that a number required is engaged. Operators also refer to their supervisors for assistance in obtaining busy lines. Under such circumstances it is the duty of the supervisor to investigate the matter, and if possible to effect a connection. The following table, representing one day's work of this kind, may be of interest as showing the results of the supervisor's investigations:—

TOTAL REQUESTS—		
By subscribers	195	
By operators	151	
		346
Engaged, speaking	157	
Engaged, but not speaking	86	
Cleared before traced	103	
		346
REQUESTS BY SUB-EXCHANGES—		
Engaged, speaking	19	
Engaged, but not speaking	10	
Cleared before traced	30	
		59

36·6 per cent. of numbers traced apparently failed to clear when finished.

There is another class of ineffective calls, due not to the number required being engaged, but to failure on the part of the Company's operator and the Post Office trunk operator who is in circuit to obtain a reply within the time allowed.

These failures are, of course, due to various causes, faults, errors on part of subscribers in the manipulation of their apparatus, etc. A typical case is as follows:—

A letter was received from the Post Office to the effect that trouble was being experienced in connection with calls for 991. On inquiry I found that 991 had lost at least twenty trunk calls between Jan. 1 and March 8. The inspection department reported: "Inspector reports trouble caused by boy who does not put hand set on rest properly. He is small and cannot reach the instrument, which should be lowered." Perhaps we may throw the responsibility in this case on No. 991.

Calls are lost, however, for which the subscriber is not responsible. Correspondence on this subject is always floating and many cases has a most unsatisfactory ending.

Between Jan. 4 and 24 I recorded particulars of 109 cases in which Manchester subscribers themselves booked calls in the usual manner direct to the Post Office. When these calls matured, which would on an average be within ten minutes, the attention of these subscribers could not be gained, and each had to be abandoned. In such cases the Post Office applies to us for a report on the state of the circuit in question, and these applications pass through the exchange inspection department. The following table shows an analysis of these 109 cases as taken from the inspection reports; the test clerk had in each case tested and reported to the inspection department within a few minutes after the failures:—

Ineffective Trunk Calls (originated in Manchester).

Instrument faults	33
Found O.K.	30
Line faults	20
Faults in testroom	4
Faults in exchange	7
Fitter working	1
Gang working	1
Subscriber admitted absence	2
Subscriber admitted receiver off	1
Subscriber admitted switch in wrong position ...	5
Receiver off	3
Cradle held up by writing pad...	1
New telephone subscriber did not understand ...	1
	109

I am sure that there is room for some improvement here if we give the matter close attention.

In closing, the following suggestions indicate measures whereby a reduction in ineffective calls may be obtained.

(1) Subscribers with a large traffic should have a corresponding telephone equipment, worked as a private branch exchange, the junctions being connected to consecutive numbers in the multiple.

(2) The necessity for prompt and effective clearing by both parties to a conversation should be impressed on all subscribers.

(3) Subscribers should not encourage keeping a connection up for a long period during which they make enquiries or search for information, but should clear and call again.

(4) The subscriber's telephone or telephones should be attended by a competent person, properly instructed in the correct method of working the service.

(5) Good maintenance and prompt clearing of faults; good construction in the beginning need not be insisted on.

(6) The more general adoption of message rates.

THE SECRET OF ORGANISATION.

THE chief clerk of a district office in charge of about 10,000 subscribers says that the work of his position accumulates so that he finds it almost impossible to handle the position properly. Another chief clerk of an office in charge of about 9,000 subscribers is able, not only to keep his office up to the top notch of efficiency, but to get out and hustle for new business. He figures in rolls of honour and private branch reports. Why is this?

One man insists on seeing it all done himself. He must dictate all letters, he must pass on every question, no matter how trivial, he must handle every detail of a case—in many cases, he doubtless digs in the letter file or the card catalogue for the information he wants. The other man has his stenographer, line order clerk, advertising clerk, etc., so well trained and so *self-reliant* that ordinary routine matters are disposed of by them without assistance. Special cases only require attention higher up. He in turn winnows out the matter for the district manager's personal attention.

Mr. Spencer, in his well-remembered talk to the Telephone Society on "Organisation," said that a good business man never liked to give up any duties which he had handled in his position, and he described the sense of loss that he felt when the purchasing department was abolished and its duties transferred to the Western Electric Company. But as he went on to explain, it is essential that detail be passed on to others so soon as a man's position grows enough in importance to require that he should have assistance. If this is not done *thoroughly* the more important duties of the position, and the generalship that should be planning the points of a large or small campaign, are being slighted in order to dig over the dry husks of routine details.—*The Telephone News*, Philadelphia.

HELPS AND HINDRANCES TO GOOD OPERATING.

BY MISS A. DUGGAN, *Chief Operator, Dublin.*

THE most essential helps to satisfactory operating are good apparatus, an even temper, and tact. Defective instruments, which require a repetition of a number from either subscriber or operator, cords too short to reach the jack required (thereby obliging the operator to make a second attempt), keys and clearing lamps not directly opposite the cords to which they belong, numbers working on wrong multiples—in short, everything that puts an extra strain on an operator is detrimental to good operating. Subscribers who do not know or will not give numbers are responsible for no small amount of friction. Another hindrance is the office boy who has a mania for turning the magneto handle unnecessarily, and who will tell a subscriber requiring an extension station to "Ring away till he gets them," with the result that subscriber is cut off by the exchange and has to call again.

One subscriber, for example, knows the street number but has forgotten the name of the firm or the telephone number, and expects to get through immediately! He is switched through to another official to get the number and comes back again to the operator, very often having promptly forgotten the number which has been given him. Another objects to looking up numbers and will say "No time," and refuse. A third habitually leaves the telephone off the rest, and a fourth habitually answers after long delay. This reminds me of a conversation which took place over the telephone between two persons, one of whom was speaking from a distant office to the office boy in his own place of business; the office boy did not reply promptly, and the other having used strong language, was interrogated by the office boy as follows:—"Are you done?" "Are you quite sure you are done?" and being answered in the affirmative the boy continued "Well, all them names you called me, you is."

Some subscribers when told "Can't get them," or "Engaged," will insist on the operator trying again and again, or say "It's my own office, it can't be engaged," and failing to get them will emulate the office boy in turning the handle till he gets the number required, which can only be given when the line becomes disengaged in the ordinary course.

A most fruitful source of delay is the automatic box call office, as the people who use these offices are mostly people who have never seen or used a telephone before and have to be educated (the fee for which is far too small) as to how it should be used. Caller rings and operator answers "Number, please," "Number, please." No reply. Another ring, again operator answers "Number, please" (caller has now got telephone off), no reply. Operator, "Press speaking key on handle," and at last caller presses the speaking key, more by accident than design, and manages to make himself heard, and just as likely will blame operator for delaying him. Number is given and operator engages line; the caller is then asked to put his penny in the box, and it is generally found caller has either put the penny in before he rang or can't get it in. In this case it is well to get the caller to turn the handle before trying to force his penny in, when it will be found that the penny which someone else put in the box and let remain in the slot will drop in and clear the box. Thus one may save some inspector an unnecessary visit. The operator not hearing buzzer tells caller to turn the handle on money box, and is fully aware he turns the handle of the generator and not the one she told him; after considerable delay and loss of temper, the caller finds the right handle and turns it. In nine cases out of ten callers put the penny in first, and if doubted threaten to report the operator, or if they comply with the instructions (which I would suggest should be on the box, as callers rarely read the card) and fail to get the number required, they accuse the company of taking money under false pretences and go away with a very bad opinion of the telephone and how it is worked.

If automatic boxes are a necessary evil and cannot be done without, I would suggest that they be so arranged that the putting of the penny in the box would call the exchange, and a still greater saving of time and temper would be to make the same penny cut off by giving the clearing signal when time is up.

An operator can help the operating by always having a plug ready to answer with and by clearing promptly. An operator who answers quickly, but is slow to clear, is not the best operator, as what she does well on one hand she undoes on the other, and delays two and perhaps more calls, in the case of junctions or transfers. She should also note and report any slight defects on cords, jacks, lamps, etc., that she may happen to find while operating, as it is the little things that count, and a little care and tact will prevent many a complaint. For instance, a subscriber who has got disconnected in some way that cannot well be explained at the moment, and wants to get through again, starts by saying "You cut me off." Although perhaps the operator had got the clearing signal, or had not had the connection at all, if, instead of arguing the point, she would say "Sorry," and put subscriber through again, leaving the explanation for some other official whose business it is to explain troubles, she will be doing the best work. It will be generally found that the subscriber's chief desire is to get his number back quickly, and he can dispense with the explanation. Any expression which has an irritating effect should never be used when dealing with a subscriber, and everything which is not straightforward operating should be put through to the clerk-in-charge or monitor, as any delay caused to the operator means a block to the service, just as a car drawn up in front of a procession will stop the traffic for the time being.

An operator can delay not only herself but the operater beside her and her subscribers by going too far to one side for a number required, which could be got much nearer on the other. Supervisors can do much to help by drawing the operators' (particularly juniors) attention to these defects, and by getting them out of their difficulties in periods of heavy traffic, when the peak of the load is on, and during the luncheon hours, which are not supposed to be so busy as the other hours of the day. In my opinion, however, this is a most trying time for both operator and supervisor, as operators take a larger number of subscribers and consequently a longer stretch of switchboard, and are handicapped frequently by having to operate a section with a much less experienced companion.

Constant fault finding is a mistake. An operator who finds, when she is doing her best, that her statements are doubted, will cease to take an interest in her work and will not volunteer information which may be of use in preventing trouble. A little consideration for the operator and defence of her from unjust attacks like the following:—"I suppose she had her fingers in the pages of a novel and would not answer me," will go a long way towards getting better results. As a cure for such unjust remarks I would recommend a visit to the exchange, when I venture to say the subscriber will leave it a wiser if not a better subscriber.

Subscribers of this kind are frequently under the impression that the operator has little to do and has much spare time between calls; an inspection of the exchange would show them that the operators are unceasingly occupied and always on the alert, from morning till night.

In the Dublin Exchange there are automatic lights fitted over each section of the switchboard; these have proved a very valuable help to night operating, as when a subscriber calls or clears, the lamp over the section lights and remains alight till the operator attends; as the switchroom is a long and busy one, it enables the night operators to see in a moment the section a subscriber is calling or clearing on, and secures for the subscriber prompt attention.

A mirror is placed above the switchboard (the idea of our late switchroom manager, Mr. NAPIER) and reflects the keyboard, enabling the clerk-in-charge or supervisor to see at a glance any irregularity in operating and to remedy it.

The subscribers who make the best use of the service and get the best results are those who are careful to make themselves acquainted with the rules drawn up by the Company for working the service, and who appreciate the efforts of the operators, realising that they have many demands on their time and attention.

64·32 PER CENT.

By W. A. VALENTINE, *District Manager, Glasgow.*

ALL the employees who take an interest in the Company's progress will have read the President's remarks at the recent General Meeting of the Company regarding working expenses. A curve is given showing the percentage of working expenses to net income since 1894; the 1906 figure given is that for the half-year ending June 30.

Without touching on questions of policy outside one's province it may not be out of place in the JOURNAL to consider whether the staff can improve this figure in future, and if so, how.

There are two points to consider:

(1) How can the revenue per station be raised? and

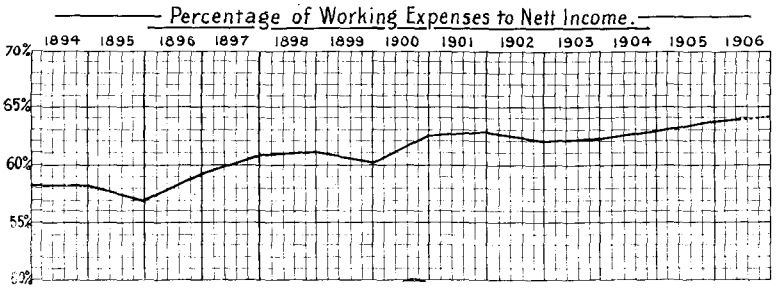
(2) How can the expenses per station be reduced?

1.—While the Board have fixed certain rates to suit all classes and to bring in the smallest tradesmen, still when new subscribers sign a message-rate contract they are very apt to underestimate their requirements.

As an illustration of this, I find on examining 200 measured rate subscribers' cards that 19·5 per cent. increased their rate of subscription during the past year, owing to the fact that they had made greater use of the telephone than they anticipated.

It is further interesting to find that in three of the city exchanges where few residences are connected the figure was actually 28 per cent.

When these agreements were signed it is clear that the officials of the Company dealing with them had failed to point out to the new subscribers, or at any rate to convince them, that they ought to go in for a larger number of calls from the beginning, the result being that in a short time the subscribers had to be advised and changes made in the switchroom and in the Company's books, and occasionally also in the subscribers' telephone numbers.



In one centre the revenue during the last six months, taking *all* superseding contracts into account, has represented an increase of 32·5 per cent. over the superseded revenue.

While this is very satisfactory, the question arises: To what extent should this have been anticipated when the contracts were signed? With the higher-priced services the subscribers obtain better service and the Company more revenue.

Operators can help in those centres where automatic methods are not yet in force for recording calls, by exercising great care to record all calls. A large sum of money is lost by the Company yearly through failure to record the proper number of calls.

Suggestions might further be made by the staff for making call offices better revenue-earning centres than at present.

2.—With reference to expenditure, while it is the case that there is Head Office control of the larger items of expenditure, the humblest member of the staff has the opportunity of saving the small item of expenditure without detriment to the service.

The Engineer-in-Chief's text for last session's lecture to some of the telephone societies was "Efficiency with Economy." Can this motto be handed on and reach every one of the 16,719 members of the staff?

One thing is clear. During the next five and a half years nothing must be done to allow the efficiency of the machine to deteriorate, rather the reverse, but in numerous ways economy may be practised while efficiency is maintained.

Every department is a spending department, and an illustration or two may serve to show how money may be saved.

In connection with exchange repairs, in many places the old gas burner is used for heating bolts; by scrapping all the old burners and adopting new Stock List No. 1 heater, with automatic cut-off, an immediate saving can be made in all large exchanges.

In the matter of lighting—and this affects all departments—who has not seen the unnecessary gas or electric light burning when an employee is out for lunch or for other reasons away from his post?

By more careful manipulation of the apparatus operators could save the cost of repairing the broken switchboard key or disconnected cord.

An inspector when attending to a definite fault reported at a subscriber's telephone can save a second visit by carefully inspecting the entire instrument and detecting some flaw which otherwise would shortly develop.

Outside faultsmen, by carefully soldering repaired joints, may save future complaints and the cost of further visits and tests.

The JOURNAL is to some more interesting reading than Service Instructions, and may reach callous members of the staff who fail to grasp the whole meaning of the second portion of our suggested motto—"Efficiency with Economy."

REVIEW.

THE PRACTICAL TELEPHONE HANDBOOK.

A NEW edition of this well-known telephone manual, by Mr. JOSEPH POOLE, A.I.E.E., Whitworth scholar, has lately been issued by Messrs. Whittaker & Co., of 2 White Hart Street, London, E.C.

This is the third edition of Mr. POOLE's valuable work, which has been entirely rewritten and greatly enlarged. It is a substantial volume of 525 pages, the subject being divided into 31 chapters, with various appendices; there are 473 illustrations, of which many are new and almost all well executed. The printing is good, but the paper is rather thin and transparent, and the binding might be better. The price is 6s. net.

Mr. POOLE has succeeded in producing a very complete compendium of modern telephone apparatus and methods, and has included a quantity of data relating to special systems and to special branches and applications of telephony which make his book extremely useful as a work of reference.

The general plan of the book is well known, and in the present edition the original structure has been expanded to deal with the additional material supplied by the progress of the telephonic art. Very clearly and succinctly each important branch of the subject is traced from its beginnings to present-day practice, and although Mr. POOLE expressly disclaims having dealt with all branches exhaustively he may be congratulated on giving a clean cut survey of each important division of the modern telephone system.

The earlier chapters deal with general theory, batteries, history of the telephone, receivers, transmitters and complete instruments. Then follow ten chapters which describe the evolution of the modern exchange and set out present common battery practice. Two chapters are devoted to the auxiliary apparatus and power plant, and one, a useful novelty, to "Traffic Statistics." Then follow chapters on aerial and underground construction, long-distance working, faults, measurements and special exchange systems, this last giving a useful record of various departures from sound telephone practice. Finally there are chapters on automatic systems and on miscellaneous special applications of the telephone. In the appendix are given the Agreement of 1905 between the Post Office and the National Telephone Company, with the accompanying specification, statistics of telephone development in the principal countries and cities, and other useful telephone data.

Mr. POOLE's book should be in every telephone man's library. A careful reading of it would improve any telephone man's knowledge of his work.

ECONOMY.

By F. DOUGLAS WATSON, *Superintendent for Scotland.*

A PROBLEM which has always been with us, which is with us now more than ever, and is not confined to telephony, is how may we most economically conduct the business. There is no doubt sometimes a temptation on the part of the Company's officials who are in immediate charge of the spending departments to take a narrow and delusive view of what is real economy. In a standard dictionary of recent date the meaning of the word is stated as "a frugal and judicious *expenditure* of money," and it is in that sense that I wish to speak of it in this connection.

Seeing that money *must* be spent in maintaining the system in efficient order, the question resolves itself simply into how it is best to spend it, and there can be little doubt that the actual control of the matter rests very largely with the rank and file of the staff, and not with those in a higher sphere who decide how much is to be spent.

We have heard of "dead charges"—and no doubt they bear an important relation to total expenditure, but such items after all are inevitable, although very likely they are capable of reduction.

A foreman and his gang must spend time in the store getting out material. An inspector must spend time in writing up his reports. All sections of the technical staff must lose time in trains and tramcars, etc.

But there is another point of loss very difficult to measure, either in time or in money, and it touches every member of every branch of the staff. I refer to the manner in which each member of the staff spends that portion of the Company's money which is represented by his own wage, and by the material which he uses with his own hands. The percentage of working expenses to revenue which periodically is reported to the General Manager is affected by this to an extent which probably no one realises.

The main purpose of these lines is to make an appeal to the great army of workers now employed by the Company, linemen, inspectors, storekeepers, operators, clerks, to realise this fact, and to endeavour individually so to carry through the work allotted to each as to effect that economy in the Company's expenditure which it is hopeless to attempt in any other way.

This suggestion is not made to that small number of the staff who, I suppose, we must always have, and who must be aware themselves of culpable carelessness or indifference in their work. It is to the very much larger number, the great majority, who are working quite honestly, but who perhaps have got more or less into a routine method and have lost sight of the practicability of improving upon their previous record from time to time. The following is a simple illustration of what is meant:—

The Company have 1,100 inspectors in their service. Let us assume that each of these is making at present on an average fifteen calls per day. Suppose it were possible to increase this number on the average by two, it would mean that our subscribers' telephones would be improved by 13 per cent. It is quite fair to infer that the increased frequency of such visits would increase the efficiency in a corresponding ratio, and would at once react upon other items of expenditure, principally operating and clerical, and reduce the expenditure under these heads. In many districts an average of seventeen calls per inspector per day is largely exceeded. In some districts of a scattered nature it is impossible to come up to that average, but whatever the present average may be, I believe it to be quite possible, by the exercise of a little more energy on the part of each man, to increase it all over. My suggestion does not resolve itself into one of simply increasing the number of calls by an inspector, but I have selected that as a natural illustration of what I think is possible in *every department* of the Company's work.

In a recent number of an American telephone publication there was a very suggestive article entitled "The New Spirit," in which the call was made upon all branches of the staff to make a more decided attempt to grasp the full possibilities of the telephone service, and to work with that end in view as their ultimate goal. If this be the spirit in America, there is a much larger field for it in this country where we have as yet attained to nothing like the development they have on the other side.

The substantial economy which is possible by such zealous and conscientious service will only be attained by small, and what may at first appear insignificant, items of retrenchment; but in such a huge system as the Company now controls a mere fractional percentage of saving per station runs into large figures in the aggregate. We had at June 30 386,623 stations in the United Kingdom, and now the total must be approaching 400,000. A saving of one halfpenny per station per month means in round figures £10,000 per annum. Suppose it were possible to economise to this extent during the current twelve months in each of the following departments:—

Line repairs.
Instrument repairs.
Operating.
Wayleaves and roof repairs.
Office.

The net saving at the end of the twelve months would be over £50,000. Such a saving during the six months ending June 30 last would have reduced the working expenses from £646,000 to £671,000, and the percentage of that total on net income would have fallen from 64·32 to a fraction under 62 per cent., a figure which has only been once reached in the annual accounts since 1899.

It is unlikely that these lines will be read by every member of the Company's staff, but the chances are that every district manager may see them, and I would urge upon all such officers the advisability of taking up with their heads of departments, and through them with the staff of the various departments, this question of economy. Doubtless in some districts more than in others the point has already had attention. Speaking for my own province I have had great satisfaction and pleasure in noting the energy and enthusiasm with which the staff, as a whole, is imbued, but there is room for improvement everywhere. In the pressure of special work from week to week and from month to month this point is one which is apt to be lost sight of, and the staff are not always instructed in practical methods of economy and in the importance which attaches to every man doing his work as quickly and as well as he would if working absolutely for his own pocket. We have a saying in Scotland "Mony littles mak' a muckle," and that exactly embodies the idea which is in my mind and which I should like to suggest to all my fellow-employees in the Company's service.

THE LIGHTER SIDE.

By H. JULIUS MACLURE, *Contract Manager, Brighton.*

THAT the affairs of such a serious undertaking as a telephone service should ever lead to mirth seems almost incredible, but the fact remains. Hence some compensation for hard and trying duties may occasionally be found by noting and enjoying some of the sayings and doings of those around one.

How many of us remember the occasion upon which a certain officer, still in the service, was asked by a then Director what a condenser was. Unfortunately our esteemed colleague was unable to answer the question, and hastening to one of the most popular men in the service put the query to him. Our inquiring friend received a lucid answer, and as an illustration it was pointed out that, as a pint measure would hold a pint of liquid and no more, so a condenser would only absorb a certain charge. The reply the astonished Director received was "Please, Mr. —— says a condenser is a quart pot."

That the Head Office staff in the old days should be proud of the strong room at Oxford Court was natural. Its size and shape alone, especially the latter, gave it distinction. But when the door upon one occasion declined to close owing to an old check book having got jammed in the hinge, it certainly came as a bit of a shock to the testroom staff when the latter received a request for the carpenter to see to the strong-room door, as it had WARPED.

Will any of the privileged few who saw that Post Office cable being drawn in at Oxford Court some ten or twelve years ago ever forget the episode? Let us attempt to explain what took place. As everyone knows, the Court had some sharp turnings, and the Post Office did *so* want to save that extra joint. Then the happy moment arrived when the nose of the cable was visible in the pipe where its end opened out into the basement. Ah! that basement!

That ventilating shaft which pierced the far wall opposite the cable pipe and ran like a 3-ft. 6-in. tunnel under the General Manager's room. The old kitchen table between the pipe and the shaft; the pile of packing cases and the other lumber. But let us picture the scene. The four men at the rope near the cable end; the four men on the table; the two behind it, and the other two men in the tunnel. The foreman's words "now all together." That long, strong pull; that broken cable end; the men who had been *on* the table, *in the tunnel* with the two already there; the men who had been before the table, under it; the foreman between the table top and the pile of packing cases which all had arrived upon the table subsequently to the foreman. The moment's silence after the crash, and then "Hi, Bill Jones, take your etc. foot out of my etc. mouth"—but let us draw a veil.

The Post Office made that extra joint.

How few now remember that district stores clerk who on the last day of a certain March made out a requisition for a greenhouse to be erected in the chief clerk's back yard; but why did the district manager sign the requisition the next day without reading it, and then have it despatched to Head Office? Still it was unkind of Head Office subsequently to enquire if April 1 was the district manager's birthday!

That *précis* writing might form a subject worthy of the attention of the powers who run the technical classes is suggested by the few following gems collected from canvasser's reports:—

"I suggest that as a means of advertising the Company's service, each subscriber should have his telephone number on his bags." That the canvasser in question had been calling on small shopkeepers is worthy of explanation; still, he hardly wrote exactly what he meant.

"I called and saw this gentleman, but he was not in. Returning (to the station) I met him in the road going home and secured his order. *Note.*—As he was on the platform when I reached —— Station, I did not have to go to the house." Even after this the contract was in order.

"I spent all morning looking for this man and could not find him as he has been dead six weeks, so his wife says."

"This lady would not fill in her occupation, as she is strictly private."

"I called on this reverend gentleman as instructed. He is a fit inmate for Hayward's Heath (the county asylum), with an ear trumpet. He was most insulting. He said I was an agent, and as such everything I said must be lies. He said: 'I am a clergyman and you are a liar, but my cloth does not allow me to say so, but you are all the same.' He is 96 and looks as if he would soon be dead, so I suggest the contract manager sees and makes sure of him without delay."

Even the Sales Department provides a joke. On one occasion a subscriber who had purchased some pairs of metaphones, reported that they were all out of order. On enquiry at the house, the servant replied there was nothing at all the matter, and that a mistake had been made. On the canvasser pressing for some explanation, the mistress of the house said: "Well, Mr. —— has a failing, and last night, when he came home a little late, he took up a hunting crop from the hallstand and spoke on that instead of the metaphone."

In conclusion, the following reply, received from a gentleman to whom an application had been made for permission to attach a single pair of wires to some stable premises in Worthing, requires a considerable amount of beating. "I should be disposed to grant your application provided you allow me a free telephone for use throughout the United Kingdom. I would not object to pay a small fee when I require to speak to Paris, but you must guarantee a good service. Please reply on this point." This worthy now receives 1s. per annum for the attachment in question.

AN APPRECIATION OF THE NATIONAL TELEPHONE COMPANY.

IT is unhappily somewhat a rare event for comments in the Press on the work and on the position of this Company to do justice either to our achievements or to our difficulties. That this Company has developed the second largest telephone system in Europe, and has developed it with commercial success in the face of every conceivable obstacle and in spite of official obstruction of all grades are facts that are generally ignored. It is so much easier to indulge in cheap sneers and inaccurate comparisons than to study records, accounts and statistics and to extract the facts. All the more welcome, therefore, is the article entitled "National Telephone Company, Continued Progress," published in the *Statist* for July 14. The *Statist* ranks easily first as a serious and authoritative journal of finance and trade, and the article, from which we quote extensively below, omitting chiefly the numerous tables of financial statistics, shows evidence of having been based on a careful and minute study of the situation of the telephone business in this country.

> "The shareholders are doubtless well pleased to find that the business of the Company shows no signs of diminution; on the contrary, gives the most ample evidence of vitality and progress. That such is the case is satisfactory from a broader point of view than that of a shareholder of the National Telephone Company, Limited, and whereas complaint has been made in the past, and, perhaps, to some extent rightly so, of the backwardness of the telephone system of the country, the fact that the business of our Telephone Company is increasing shows a healthy state of affairs, and is a somewhat remarkable instance of the fact that private enterprise is still able to justify itself by the exceedingly good results that it produces. We have said that to some extent, perhaps, the complaints of the backwardness of our telephone system have been justified. To those who know anything of the matter, the wonder is that the system of telephony in this country has made such good progress. It is unnecessary for us to recount to our readers the various struggles that the National Telephone Company, Limited, has had to pass through during the period of its existence. Not only has the concern been harassed and opposed by the Post Office, but the various policies that have been adopted, and the vacillations shown by Government after Government have naturally tended to hinder the progress of the telephone. Not only has the Company, however, had to meet that opposition from the Government, but various municipalities also have done their best to prevent the telephone system from becoming a success. Wayleaves have been refused, and the Company has been obliged to put up with an inferior system owing to the impossibility of obtaining the requisite powers to enable it to instal the most efficient and up-to-date systems. Then in many cases also rival systems have been set up by certain municipalities, and competition has ensued, on the whole not with satisfactory results to the users of the telephone, and it seems reasonable to suggest that, of all things, the telephone system is the one where a monopoly seems justified. Municipal telephone systems have not proved the greatest of successes, and it is not surprising to find that in one case after another the municipalities have decided to hand over their systems to the National Telephone Company. We have already stated that the Company continues to grow very rapidly and to show a considerable amount of progress. Had the Company been free from the large amount of vexatious and harassing interference that it has had to encounter, there is no doubt that its progress would have been at a much greater rate than it has, and the community would have been served with an even better telephone service."

After quoting and commenting on numerous financial tables, the article goes on to say:

> "It is thus evident that the Company is in a thoroughly sound position, and that the business shows continuous expansion. With the most recent addition to the reserve fund, this will amount to £2,065,943, which is, of course, a very substantial sum, though it may be recalled, on the other hand, that the total capital in issue amounts to £9,704,093. This reserve is invested entirely in the business of the Company. Had it not been for the accumulation of this substantial sum, however, it will be recognised that the capital account must have been considerably larger than it is, and the Directors have very rightly carried out a

conservative distribution policy, keeping a fair supply of available working capital in hand in preference to dividing up to the hilt. It is satisfactory to find that the Board have determined to push the business as efficiently as possible in the short time that still remains to them. There has been no slackening of the oars, and the policy of the Company is to take on as much new business as it is possible to do. Naturally, of course, this will mean that further capital will be required, and inasmuch as the capital expenditure works out at about £1,250,000 per annum, it may be anticipated that a further sum of from £5,000,000 to £6,000,000 at least will be required before the expiration of the Company's license in 1911. This would mean that the capital in issue at the end of the Company's life would be from £15,000,000 to £16,000,000, and this may possibly approximate the sum which the State will have to pay for the acquisition of the telephone system of the country It is to be desired, consequently, that the Post Office will not extend its system more than necessary, and especially where it comes into competition with the National Telephone Company. To some extent, of course, a fair amount of duplication has been brought about during the time that the Post Office was actively competing with the Telephone Company, and naturally, therefore, there will be a certain amount of unnecessary plant in use when the Post Office absorbs the National's system. Doubtless the Post Office will see the advisability of not carrying the duplication any further.

"Though it has been stated that this country is the worst supplied in the world with telephones, the statement has been made by people who have more regard for picturesqueness of language than for accuracy of statement. As a matter of fact, as Sir HENRY FOWLER pointed out at the last meeting of the Company, 'we are the second best in the world.' Greater London has a population of six and a half millions, and Greater New York five and a half millions. In London there are slightly over 120,000 stations, while in New York there are nearly three times the number, amounting to 280,000; so that a considerable amount of leeway has to be made up before our system approximates to that of New York. At the annual staff dinner of the Company, held in May last, the GENERAL MANAGER pointed out that the British Isles alone had more subscribers and handled more messages than all the following countries put together, viz.:—Austria, Belgium, Denmark, Holland, Italy, Norway, Portugal, Russia, Spain and Switzerland. The only European country that compared with us is Germany, which had 10·2 telephones for every 1,000 inhabitants, whereas Great Britain and Ireland had 10·15 per thousand. London alone has as many telephones as the whole of France. It will be recognised, therefore, that, working under considerable difficulties, the National Telephone Company has given us as good a telephone system as it is possible, and it may be considered that when the whole telephone systems of the country are under one management that still further progress will be made; at any rate, this should be the case provided proper management is shown. It may be remarked in passing, however, that a department which has shown itself unable to work the telegraph system, except at a heavy loss, hardly appears the best qualified to provide the most efficient telephone service."

MONTHLY RETURNS.—I.

BY W. BARNETT, *Chief Audit Clerk, Secretary's Department.*

I HAD occasion a few days ago to refer to Service Instruction No. 55 (dated May, 1893), and noticed that it begins by stating that "the growth and extent of the Company's business has necessitated a complete re-organisation of the administration." Thirteen years have passed, and although one province (the western) has been added since that date, the principle laid down in that instruction has been the basis on which the present gigantic organisation of 16,000 people has been built up—each one of the 16,000 units being more or less important in the perfect working of this great system, which has for its object two things, viz.:

First, to give to the public, so far as science and human skill will allow, a complete and satisfactory telephone service.

Secondly, to keep a clear, concise, and intelligent account of how the money entrusted to the Company for carrying on this vast undertaking has been spent, so that by a careful watch and systematic comparison of the various classes of expenditure, the management may judge where improvements can be made and economy practised, and may render to the shareholders each half-year an account of the stewardship.

As it has been my privilege to assist in the latter branch of the work during the period that has elapsed since the issue of the instruction above referred to, and to have had a hand in remodelling and bringing the monthly returns to their present complete form, the thought occurred to me that a paper dealing with some of the returns and accounts from the time they reach Head Office, might prove of interest to the readers of the JOURNAL, particularly those who have dealings with the returns to which I refer.

I will begin with the wages and salaries of the staff, which is always an interesting subject, particularly towards the end of January in each year. All our expenditure is classified under wages, sundries, or material.

A card is kept at Head Office for each of the 16,000 employees, arranged in order of centres, and sub-divided under the various grades, giving the name, rank, present salary, and past record of every member of the staff. These cards are posted up each week from the E, F, and G Forms, viz., for new staff, increases and alterations, and staff left respectively. An elaborate index on the card system is also kept, in order that a card may easily be turned up.

It may be interesting to note in passing that during the last five years nearly 26,000 names have passed through the records, irrespective of the transfers from place to place, which are noted on the card, and the card transferred to the new centre and the index altered accordingly. The time has now arrived, when, except in very rare names, the bare initial is not sufficient identification. Only recently we had a case where an increase was entered to the wrong man, but it was discovered that it belonged to James —— and not to John —— before any harm was done.

On receipt of the pay rolls, of which there are 161, the additions and the working out of all amounts other than for completed weeks or months, are checked. The vouchers (in a four-week month there are over 60,000) are then called over with the pay rolls, after which each entry on the pay roll is checked with the respective staff card, or, failing a card, with the temporary staff form.

Overtime payments are checked with the 117 Form, and debits and credits with the other centre's returns.

After this a list is made of deductions in respect of Pension Fund and Staff Life Assurance Fund, for the use of the "secretary of the Pension Fund," and another statement is made for accident insurance purposes.

The totals for each week are then checked on the No. 4 Return, which is the monthly summary of wages allocated to the various accounts.

When this has been done the No. 4 Return, provided all is correct, is passed on from the audit department to the accountants' department to be journalised.

I will, however, leave it at this point for the present and pass on to the next return.

The No. 5 Return is a weekly record of petty cash payments, cheque payments, and debits and credits to and from other centres in respect of cash transactions other than wages. The returns are received from 100 centres, all sub-centres being merged in their respective cash centres.

On their arrival they are recorded as received and the additions checked. They are then examined with the paid vouchers—to see that the amount has been correctly entered and allocated, and that all payments made are in accordance with service instructions.

From 6,000 to 7,000 vouchers are thus dealt with each week, and, therefore, in a four-week month about 28,000 vouchers have to be dealt with, in addition to the 60,000 pay roll vouchers.

This number does not include the wayleave payments, which are detailed on the No. 114 Form and shown in one total on the No. 5 Form.

These are paid by cheque only, and the receipt appears on the back of each cheque.

There are about 1,500 to 2,000 wayleave payments each month. After the total for each week has been checked on to the summary for the month, the No. 5 Return is also ready to be journalised.

We sometimes come across an account which without an explanation is somewhat startling. The following are called to mind:—

An account for a "fox terrier," charged, if I remember rightly, to "operating sundries," another for a "silk hat," charged to "construction." One account was for a "fowl *run over* and killed by a falling telephone wire."

Another account, and this from a Scotch district, was for "fixing a policeman on roof."

Dogs are not the only live stock found necessary for carrying on the Company's business, as unless they have since died through their efforts to exterminate the rodents, the Company own several "mongooses," the cost, I believe, being charged to "office."

"Material" is the next section of the Company's expenditure and is dealt with on the No. 6 Return. This return shows the balance of stores on hand from last month, stores received during the month through various channels, the material issued under the respective accounts, and stores transferred to other centres.

A statement is also shown on this return of the tools account and sales stock account.

All goods purchased through Head Office suppliers as well as purchases under £2 from local suppliers are shown in detail and summarised under the various suppliers on the No. 6*a* Return, the total only being brought on to the No. 6.

The total number of invoices dealt with each month through this return averages about 7,500, and after these have been checked with the No. 6*a* Return and it is seen that the certifications for "rate charged correct," and "goods received in good condition" appear thereon, they are sorted out under the various suppliers, ready for payment.

A statement is then made of the balance of stores, tools and sales stock on hand, and worked out per station for monthly comparison. There is very little else on this return for Head Office to check, the allocation being checked with the inwards and outwards books by the travelling audit staff.

The three most important returns dealing with the Company's expenditure are now ready to be entered into the books to provide the necessary summary of capital and revenue expenditure and in order to focus the various items, the three returns for each of the 100 centres are first posted on to a Summary Form, the total of each account being then entered into a Summary Book, under the respective headings, against the name of the centre to which they refer.

This process completed gives the desired result as to the total expenditure throughout the country under each account, and the figures are then ready to be posted to the general ledger and to the monthly statement for comparison purposes. Each account in the summary books is ruled for twelve months and provided with a total column at the end of June and December for the purpose of compiling statements of the expenditure at those dates.

In a second paper I propose to take the returns dealing with the Company's revenue, and in a third to explain the relation that one return has to another and the method adopted for harmonising the returns with the Head Office books, and, finally, to comment briefly on the whole of the returns.

MULTIPLE CABLE TESTING.

By D. MACADIE, *Chief Electrician, Nottingham Factory.*

In multiple switchboards of even moderate size many miles of wire are required, and many thousands of soldered joints have to be made in connection with the multiple cables. However carefully the work of lacing and jointing in making up these cables is carried out, faults of various kinds are found; as it is of the utmost importance that these faults should be cleared before the cables are brought into use a reliable system of testing is necessary. A short description of the methods employed and the apparatus used for this purpose in the cable forming department at the Nottingham factory, alluded to in an article appearing in the first number of the JOURNAL, would, I think, be of interest to a large number of the staff.

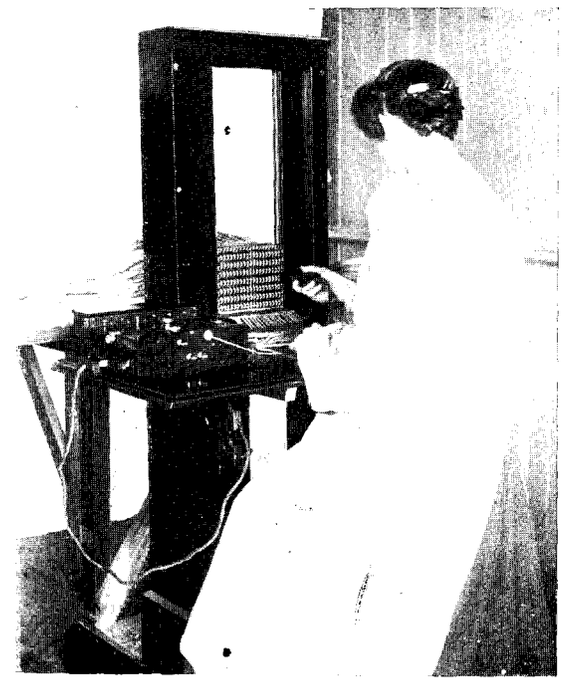


FIG. 1.—Testing Frame.

After the different processes of stripping, waxing, lacing, soldering, and examining are completed the cable is placed in a frame similar to that of a 50-line switchboard (see Fig. 1). This is fitted with an arrangement which allows the bank of jacks to be easily placed in position and held firmly.

The apparatus employed in testing consists of a circular switch

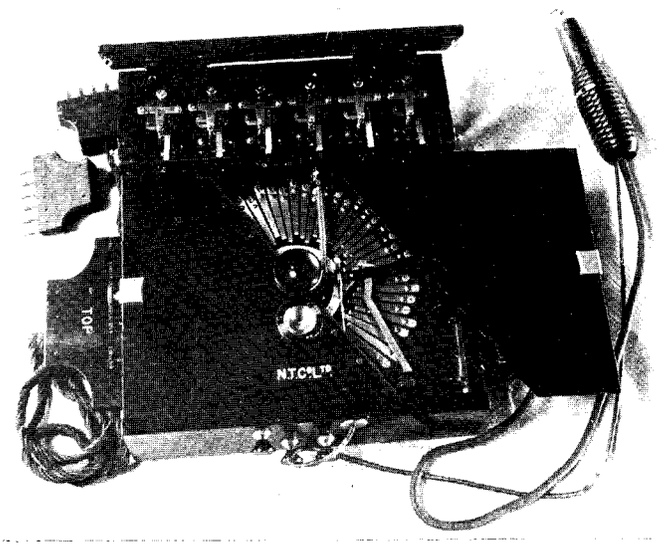


FIG. 2.—Testing Switch.

(see Fig. 2) having twenty sets of three springs which normally rest on an earth connection ring. The springs are wired to the A, B, and T tabs of a row of twenty C.B. jacks and also to a similar row of small branching jacks. Twenty C.B. plugs connected with cords to small branching plugs are used, but only one of each is shown on the diagram (see Fig. 3). Three 10-ohm and three 500-ohm relays,

arranged and lettered as shown, are employed. On the armature of each a light arm projecting in front is fitted which serves as an indicator, and the relay contact circuits are all connected up in series with a buzzer.

The centre of the switch consists of a ratchet wheel having twenty teeth and a lever and ratchet. An ebonite piece with three contact studs is attached to the ratchet wheel. These studs are in permanent connection with the coil circuits of the 10-ohm relays, and as the switch is turned round each set of springs is lifted off the earth ring and is placed in contact with these studs.

A large ebonite plug holder, drilled to take either a C.B., a small branching, or a standard plug, is employed. Between the switch and a sliding rod, which is also fitted in the plug holder, a steel spiral carrying a flexible cable consisting of a few strands of very thin spring steel wire is fitted. Each time the plug is inserted in a jack the flexible cable pulls forward the lever which operates the switch. On the plug being withdrawn the lever is restored by a spring. Three sets of batteries are required.

When C.B. jacks are on the cables under test the twenty small branching plugs are inserted in the row of jacks on the switch, and the C.B. plugs in the bottom row of the cable jacks. The tester proceeds to plug into No. 0 of the second row of jacks; this automatically moves the switch, which was set at No. 19 to No. 0,

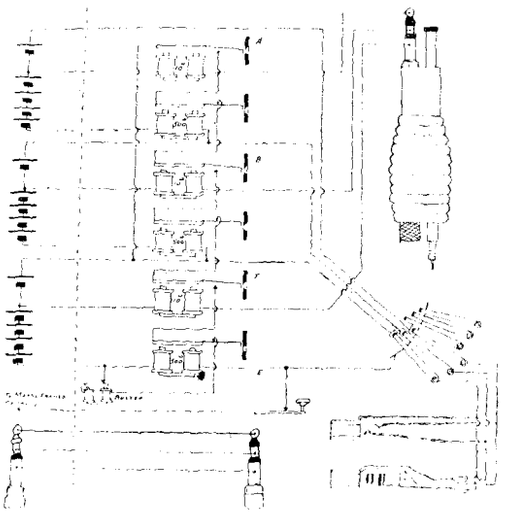


FIG. 3.—Diagram of Connections.

and the buzzer sounds. No. 1 is next plugged into, and so on throughout all the jacks on the cable. When the buzzer does not sound the faulty wire and the nature of the fault are indicated by the grids in the following manner, and are recorded by the tester. The grids named A-B, B-T, and T-E are the 500-ohm relays shown between these letters, and E represents all wires in the cable except those immediately under test:—

A disconnection on	A	wire	is shown by	A.
„	B	„	„	B.
„	T	„	„	T.
A contact between	A and B	wires	is shown by	A-B.
„	A and T	„	„	A-B, B-T.
„	A and E	„	„	A-B, B-T, T-E.
„	B and T	„	„	B-T.
„	B and E	„	„	B-T, T-E.
„	T and E	„	„	T-E.
A cross between	A and B	„	„	A-B.
„	A and T	„	„	A-B, B-T.
„	A and E	„	„	A, A-B, B-T, T-E.
„	B and T	„	„	B-T.
„	B and E	„	„	B, B-T, T-E.
„	T and E	„	„	T, T-E.
Crosses between	A, B and E	wires	are shown by	A, A-B, B, B-T, T-E.
„	A, T and E	„	„	A, A-B, B-T, T, T-E.
„	B, T and E	„	„	B, B-T, T, T-E.
„	A, B, T and E	„	„	A, A-B, B, B-T, T, T-E.

It will be noticed that in certain conditions the grids show the same way for crossed wires and wires in contact, but when the testing plug is withdrawn the grids return to their normal condition in the former, but do not in the latter case.

By pressing a key when a contact to earth is shown, it can be ascertained if this contact is with the metal frames of the jacks or with another wire in the cable.

A ring engraved 0 to 19 is fitted on the switch and the number under test can be readily seen through glass fitted over a hole made in the cover. The ring is made to turn round one division so that when the jacks are numbered 1 to 20 the correct number is still seen.

The 10-ohm relays are adjusted so as not to operate if a few ohms extra resistance is in circuit. On the other hand the 500-ohm relays are adjusted as finely as possible, and are actuated when a contact occurs having a resistance up to a few thousand ohms.

The testing is usually done by one girl, and the average speed of working, excluding the time taken in recording faults, is about one jack per second.

The apparatus above described is quite suitable for testing multiple cables fitted up in exchanges. In this case a cable long enough to reach from the centre to any part of the switchboard, for the purpose of connecting the plugs together and the battery wires to the switch, would be required. This would allow the switch to be carried round from multiple to multiple; its total weight is 11 lbs.

"THE ASTUTENESS OF THE READER."

MANY of our readers will, no doubt, be aware that some months ago a book entitled *The Four Just Men* was published, and that a prize was offered to the reader who should discover how the chief character, Sir PHILIP RAMON met his death.

Most people who read the book guessed that the telephone played a prominent part, but to telephone engineers there were some apparently insurmountable difficulties in the way of Sir PHILIP'S death being brought about through the agency of the telephone.

The result of the competition is now announced, and we give an extract from the announcement in the *Daily Mail*; we have kept to the exact wording for fear of interfering with the lucidity of the "explanation," but we are responsible for the italics.

It was intended to publish the solution in the form of a diagram, for at the outset it was feared by the publishers that very few competitors would discover and few *understand exactly* how Sir Philip Ramon met his death at the hands of "The Four Just Men." When the solutions came in, however, the publishers discovered that they had underrated the astuteness of the reader, for in all over one thousand of the competitors gave a *correct, or nearly correct*, solution, and this made the task of awarding the prizes all the more difficult. The remarkable feature of the competition was the extraordinary character of the competitors. Statesmen, great financiers, high officers of both services, English and foreign diplomatists, famous surgeons, and well-known authors all strove to solve the mystery of Sir Philip Ramon's death—some successfully, and others very much at fault.

Sir Philip Ramon had a weak heart. This much the Four did not know. When they employed Thery, a skilled electrician, with the object of electrocuting the stubborn minister, and when they engaged the house in Carnaby Street (through which ran the private telephone wire from Portland Place to the Foreign Office) they had calculated to send a *force of electricity* (by connecting the cables of their electric lighting plant with the telephone wire) as should kill Sir Philip.

But Thery bungled, and to his error Sir Philip owed his death. *For had the full "load" of electricity been sent along the telephone wire there must have been a fusion. As it was, Thery unwittingly short circuited the current, received the full force through his body, and the shock that reached the Foreign Minister was just sufficient, with his weak heart and in his then condition of mind, to kill him.*

We wonder how many telephone men gave the "correct" solution.

NOTTS FACTORY PROVIDENT FUND.

IN connection with the "Provident Fund" in existence at the Factory, it may be of interest to note, the sum of £37 16s. 10d. has been collected from the employees in "1d. a week" collections for the half-year ending June 30, 1906. The fund, as pointed out in the first number of the JOURNAL, is distributed at the end of each year among the local charitable institutions.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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ET TU, BRIGHTON!

BRIGHTON, despite its vociferously proclaimed success in the telephone business, has quickly imitated Glasgow in selling its municipal telephone system to the Post Office. In the Town Council debate on the resolution to sell, the failure of the Telephone Committee to establish a commercially sound telephone business was ascribed, with the usual picturesqueness of language that obtains in town council debates on the telephone question, to the competition of the National Telephone Company and to the criticism of the Brighton press and of some members of the Council itself. That the business was a failure from the most ordinary business reasons seems not to have occurred either to the Telephone Committee or to the majority of the Council. Yet the official records show plainly that the Brighton municipal telephone system has been a disastrous failure from every point of view. As a result of three years of canvassing and agitation the Brighton Corporation have placed 1,404 actual subscribers' lines, and of these nearly half are simply duplicates of National lines. From a development point of view, then, the municipal system has succeeded in finding about 700 new subscribers in Brighton, Hove, Steyning, etc., and to accomplish this great result has spent nearly £53,000!

As pointed out by the *Electrical Review* in an article which we quote elsewhere, the Brighton system should have cost, according to the cheap estimates which were the battle-cry of municipal telephony, about £37,000. The actual cost has been £52,700, an excess of over £15,000 or about 40 per cent. The revenue accords roughly with the estimate, on paper, but two-fifths of it is overdue and unpaid. The capital expenditure during the past year was out of all proportion to the small amount of new work done. These various facts show plainly that the Brighton municipal system has been a failure as an ordinary business concern, and afford ample reason for disposing of it. That a municipal committee, handicapped by illusory notions of telephone finance and by a complete lack of practical knowledge of the telephone business, could compete successfully with the National Telephone Company was a part of the telephonic dream which took possession of a few municipalities five or six years ago. In common with other delusions it has evaporated in the strong daylight of actual practice. At Brighton, as in Glasgow, the municipality has been left so far behind in the race that but for the timely succour of the Post Office it would soon have fallen by the wayside from sheer inanition.

INEFFECTIVE TELEPHONE CALLS.

BOTH to the telephone user and to the telephone worker the "engaged" call is the most vexatious of the various daily ills of the telephone service. To both the telephone user and the telephone worker the "engaged" call means a certain amount of work done absolutely without effect and without useful result. How much work the telephone staff and the telephone plant have to do in order to discover whether a line wanted is engaged or not the average telephone user does not appreciate. In many cases the work done is as much as for an effective call. For example, a subscriber on exchange "A" calls for one on exchange "B"; the "A" operator transmits the number to the "B" operator, who assigns a junction line between the two exchanges, and the "A" operator connects the calling line to this junction line; the "B" operator then tests the called line and finds it engaged; she has then to plug the junction line into a "busy-back" jack, which gives a distinctive signal along the junction line to the "A" operator; sometimes the calling subscriber recognises this signal and hangs up, but generally the "A" operator has to tell the subscriber that the line wanted is "engaged." Observe that all the work of building up the connection, to the very point of obtaining metallic contact with the called line, has been done; the "B" operator has got to the subscriber's doorstep, so to speak, and if his "oak" were not "sported," if his line were not "engaged," all the further work is to push the plug home and press the ringing key—work which is no greater than that of transferring the junction plug to the "busy-back." The "B" operator, then, does as much work on an "engaged" call as on an effective call, and the "A" operator does a trifle more, as she has to notify the calling subscriber that the line wanted is "engaged," while as far as the telephone plant is concerned it is used almost to the same extent for an "engaged" as for an effective call, the only difference being that the junction line is used for a shorter period of time. Yet the subscriber is almost always impatient and unbelieving, and many subscribers think that "engaged" is simply an excuse to save effort, instead of the result of a conscientious effort to execute the subscriber's demand.

Some telephone subscribers are so firm in their disbelief of the "engaged" report that to test the operators, as will be seen from Mr. NAPIER'S paper, they sometimes call for their own numbers. If they get the reply "engaged" then that confirms everything evil they have ever thought of the telephone service and of those who work it. It naturally cannot occur to the subscriber that his line is worked in two quite different parts of the switchboard, and that the operator is not necessarily aware of the number of the calling line. In answering calls she works by signal and in completing them she works by number; except for recording purposes she has no need to observe the number of the calling line, and the switchboard could be worked just as well if the answering and signalling apparatus on each line bore no numbers at all. Yet

it is extremely difficult to explain these very technical matters to the subscriber who has obtained damning evidence of the untruthfulness of telephone operators by calling for his own number and being told that it is "engaged." He has caused his line to become "engaged" by the mere fact of being connected with the operator, and she tests the inward section of his line in the same way as would an operator at any other part of the switchboard.

Telephone users would get greater benefit than they do from their telephone service, if they took greater pains to understand the difficulties and peculiarities of the service. As we have just shown, the work involved in an ineffective call is in many cases as great as that done for an effective call. Statistics show that over 20 per cent. of the total daily originating calls in our large telephone systems are ineffective for various reasons, principally because the line called for is "engaged." Those who think that "engaged" is merely an excuse we would ask to consider if it is within the bounds of reason that a commercial concern would do all this wasted work every working day in the year if it could be avoided. Naturally not. The work is done because every day many calls are made for lines that are already in use. Some of this is inevitable, because the use of the telephone is excessive during certain hours of the day and a certain proportion of calls for the same number are bound to coincide. But the proportion of ineffective calls can largely be cut down if telephone users generally will give more serious attention than they now give to the practical side of the telephone service.

The chief cause of the ineffective call is the busy subscriber who over-uses his line. Some large subscribers keep their lines almost entirely occupied with outward calls and do not give inward calls a chance. There are many telephone subscribers in every large city whose lines are reported "engaged" hundreds of times each day, simply because they will not take a sufficiently large telephone installation to accommodate the daily telephone traffic which their business gives rise to. These subscribers have not kept their telephone equipment abreast of the growing use of the telephone service. They have the same number of telephones and lines as they had when there were only 100,000 telephone users in the country. Now that there are nearly 500,000 telephone users the stream of traffic flowing to the big concerns is naturally greater than their antiquated equipment can accommodate. Consequently their business, with that of their customers, suffers; but as the ineffective calls go unperceived by the subscriber who is ineffectively called it is extremely difficult to convince them of this fact. Nevertheless, if all busy subscribers could be induced to take private branch exchanges, with sufficient lines to accommodate the traffic and sufficient telephones to put the service within direct and easy reach of the habitual users of it, there would be a large drop in the daily number of "engaged" calls and a corresponding increase in the general efficiency of the service.

The article by Mr. TAYLOR, in last month's issue, with its numerous and explicit testimonials from important Glasgow subscribers, affords powerful proof of the great improvement in the service of large users effected by the adoption of proper branch exchange equipment and operating. The operating of subscribers' telephones can be greatly improved even when the installation is not large enough to require the services of a trained operator, even when the installation consists only of a single telephone. Most subscribers do not understand that "engaged" is an electrical test, which is applied to the line from the moment the operator connects in answer to a call and remains applied until the line is disconnected. Therefore two subscribers' lines connected together are both "engaged" as long as they remain connected, whether the subscribers are talking or not. There is obviously an opportunity for subscribers to cut down the "engaged" trouble by shortening the period during which a line is "engaged" uselessly. A slow answer to the bell, the habit of "holding the line" while searching for a person or a paper, the neglect to give the ring-off signal, are among the chief causes of lines being "engaged" unprofitably. These are factors under the subscriber's control, and they are reasons why the subscriber should confide his telephone service to more intelligent care than that of the average office boy.

EFFICIENT ECONOMY.

THAT high efficiency generally means high expense is a common delusion. The contrary is more nearly true—that true economy is more generally accompanied by high efficiency. Not that high efficiency is necessarily the result of an over strict economy, for economy is carried too far when it results simply in postponing expenditure. But true economy—*careful expenditure*—induces a habit of mind which makes for efficiency. The man who thinks before he wastes material or wastes time is apt not only to avoid the waste, but to think further and to do his work in the most thorough and expeditious way.

In this issue we print two articles, both from that enlightened telephonic centre Glasgow, and, by a happy coincidence, each written without the knowledge that the other was being written, which bear on this vital question of economy. As Mr. WATSON and Mr. VALENTINE suggest, there are innumerable ways in which the great staff of a great concern like the NATIONAL TELEPHONE COMPANY may increase economy and increase efficiency. By a little more thought, a little more energy, a little more of the spirit of co-operation, much may be done both towards saving material and labour and increasing returns. Consider, for example, how many small jobs are done every day that have to be done over again shortly after. A little more thoroughness in the first place would be economy combined with efficiency. Consider how much time is wasted every day by lack of speed and directness in going from one job to another. Consider how much damage is daily done to switchboard apparatus by rough and slapdash handling. Consider how much stationery is daily wasted by writing letters on two sheets that would easily go on one. Consider how often one department may give a hint to another that an order may be got here, or that a line or an instrument wants looking after there. Consider these and a thousand other things where by a little thought, a little spirit of enterprise and keenness, you may economise and improve, raise your own efficiency and that of the whole concern. Consider.

SWAN-SONG OF THE GLASGOW MUNICIPAL TELEPHONE.

A COPY of the accounts for the last year's trading of the Glasgow Corporation Telephone Department is before us. We have previously, on several occasions, called attention to the method

of conducting the telephone business affected by corporations, but as these figures in their simple nakedness are more eloquent than any words, we publish them as they stand so that those who read may draw their own conclusions:

	Accrued Revenue.	Total Revenue Expenditure.	Surplus towards Depreciation.	No. of Stations.
	£	£	£	
1901-2	14,096	13,698	398	5,479
1902-3	35,014	33,320	1,694	9,122
1903-4	49,639	45,989	3,650	11,405
1904-5	55,426	53,922	1,504	12,362
1905-6	57,461	57,413	48!	12,821

NATIONAL TELEPHONE LONDON STAFF BENEVOLENT SOCIETY.

WE notice with pleasure the progress of the movement, of which the preliminary stages have already been reported, for the establishment of a benevolent society among the Metropolitan and Head Office staffs of the Company. Its operations will differ in some respects from those of friendly societies, while aiming, like them, at the relief of distress.

The suggestion was originated by Mr. C. B. CLAY at the last dinner of the Metropolitan staff. The members of the staff have never been deaf to appeals made to them on behalf of afflicted associates, and by voluntary contributions or "whips" they have afforded relief as cases have arisen. The new organisation is intended to do the same work, but more systematically, and to provide funds for the purpose, not by the occasional gifts of a comparative few, but by regular subscription from a large number—indeed, it is hoped, from all. This may well be achieved without hardship upon anybody, seeing that the amount asked for (an entrance fee of threepence and an annual subscription of a shilling) constitutes an exceedingly moderate demand and imposes a burden on nobody.

The reason that the contribution is so small is that this society is not on the lines of an ordinary benefit society, whose members secure specified benefits in case of sickness or death. The new organisation does not ensure aid to any member as such, but is intended to provide funds out of which relief may be given with more certainty than at present. The object is, therefore, charity rather than self-help, but on a better plan and with larger resources.

When Mr. CLAY made the suggestion which has now taken definite form, he related some instances of want and suffering that had come under his notice. Calamity may happen to all, and whenever it overtakes a fellow-officer there is, happily, a widely-felt desire to express sympathy in a practical way. It is obviously better that relief shall be supplied, not by an appeal on every occasion to the general body of employees, but by the deliberate act of a committee dealing judiciously with funds subscribed by the whole staff, not necessarily for themselves, but as a provision in time of need against suffering or unforeseen adversity.

The Directors of the Company have given a donation of £50 towards the funds of the society, and we heartily commend it to the support of the employees of the Company in the metropolis.

READING COVERS FOR THE JOURNAL.

AT the request of several subscribers the Editor has arranged to provide cloth covers with cord loops for holding twelve issues of the NATIONAL TELEPHONE JOURNAL. These are obtainable at any district office at *6d.* each.

THE BRIGHTON TELEPHONE SALE.

THE Brighton municipality has quickly followed the lead of Glasgow, says the *Electrical Review*, in selling to the Postmaster-General the telephone system established a few years ago. The total capital expenditure to the end of March last was £52,718, and the purchase price agreed on is £49,000. The Postmaster-General originally offered £41,200, that offer being based on an expert valuation of the plant. But municipal telephony is not concerned with values or practical business questions, and the Brighton M.P.'s being brought into play, the Postmaster-General was induced to raise his offer by £7,800, which lets off the Brighton Corporation with a relatively small loss in actual cash.

Like that of Glasgow, the Corporation of Brighton has been severely beaten in the competition, the National Telephone Company's system having considerably more than double the number of telephone stations served by the municipal system. For some time past the latter system has been at a standstill, and lately its small circle of customers has begun to diminish. In the face of such a complete business failure there was nothing left for the Corporation to do but to sell out to a benevolent Government. It is instructive to compare the actual results of the Brighton municipal system with the plans and estimates on which the business was founded. The estimate provided for 2,080 subscribers' and public station lines at a total cost, allowing for 600 partially completed spare lines, of £43,280. The actual capital expenditure is, as noted above, £52,718, and the system actually contains 1,514 subscribers' and public lines. According to the estimate the present system, including all extension stations and other extras and allowing for 600 spares, should have been built for about £37,000. In proportion to business done the estimate has been exceeded by £15,000, or 40 per cent. In these circumstances, and in view of the fact that after three years' hard work it has not succeeded in getting more than three-quarters of the estimated number of subscribers, the municipal Telephone Committee is to to be excused for wanting to sell the business as quickly as possible.

A brief examination of the accounts published by the Brighton Telephone Committee at the time the resolution to sell was brought forward, shows the usual anomalies and the usual suggestive contrast between revenue and capital expenditure. The gross income for the year is shown to be £9,421, but of this nearly £4,000, or over 42 per cent., is overdue from subscribers. The working expenditure for the year is put at £5,780, but the capital expenditure for the year is entered as £7,395, although only 186 actual lines were added to the system during the year, and the majority of these should have been served by plant already in existence. The large capital expenditure for the year, compared with the small addition in working stations and compared with the very low working expenses, is calculated to throw a doubt on the correctness of the method of bookkeeping followed by the municipal telephone concerns. This doubt is increased when some of the items of capital expenditure are analysed. It appears that during 1905-6 the average cost per mile of overhead metallic circuit was £28 11*s.*, whereas up to the end of 1904-5 the average cost was only £25 14*s.* During 1905-6, 231 instruments were added at an average cost per instrument of £6 15*s.*, whereas the average cost per instrument up to the end of 1904-5 was only £3 9*s.*, or a little more than half. During 1905-6, £2,461 was charged to underground construction, but the only addition to the underground plant which appears in the statistics is twelve miles of metallic circuit. Presumably the money was spent on ducts not occupied by cables or on work which should have been charged to reconstruction or repairs. In any case the cost of the work done in 1905-6, as shown by the capital account, points very strongly to the suggestion that the charges against revenue have been lightened at the expense of the capital account.

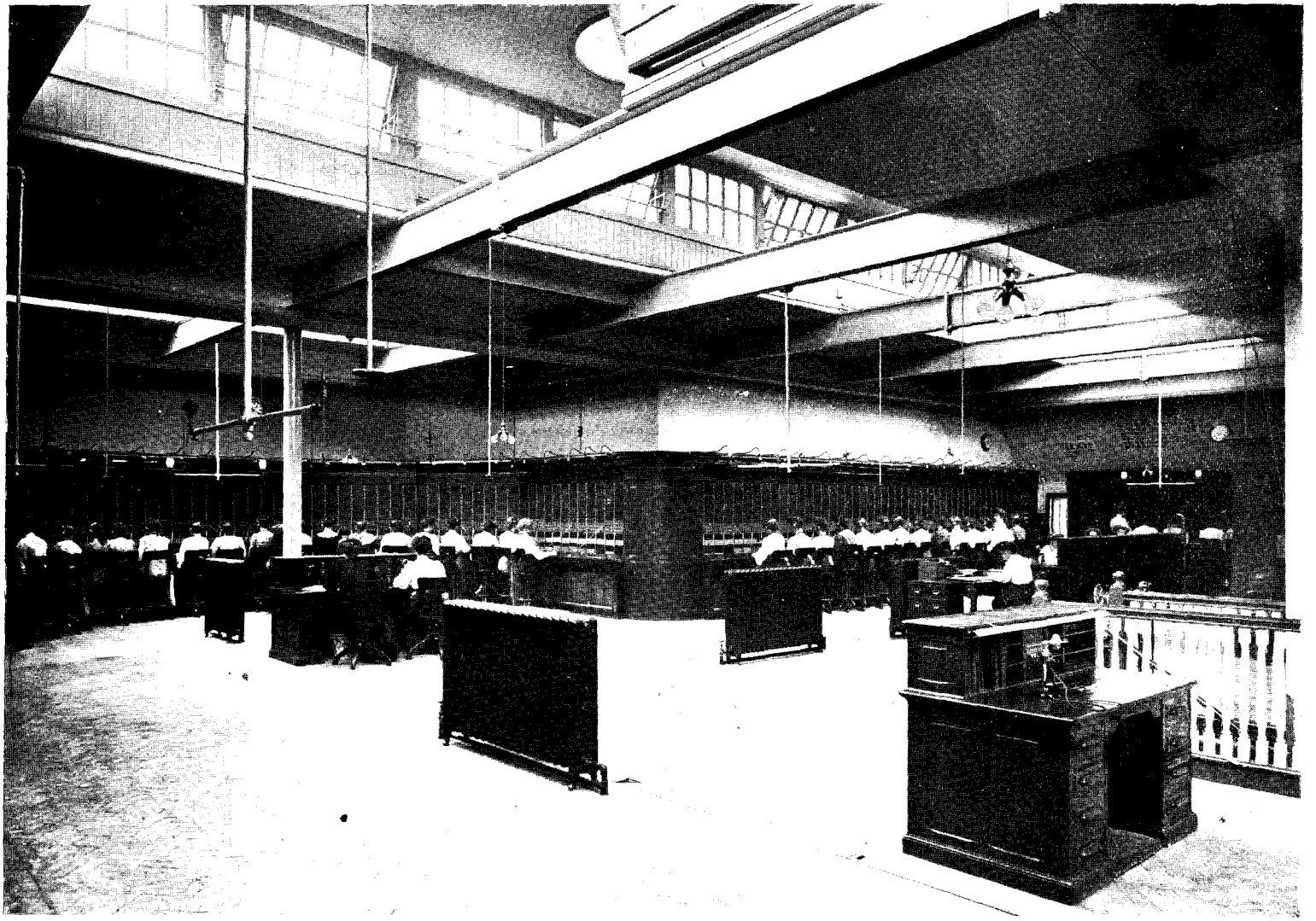


FIG. 1.

THE NEW COMMON BATTERY EAST EXCHANGE, LONDON.

BY H. S. THOMPSON.

ON Saturday, May 26, another advance was made in connection with the conversion of the London telephone system to standard common battery working. The Company's East Exchange, which serves the greater part of the East-end of London, was successfully transferred to a new common battery equipment which had recently been completed in the Company's existing building at Limehouse.

Before the actual installation of the new equipment was commenced extensive additions were made to the building, which was already accommodating a 1,750-line magneto exchange.

The switchroom, located on the top floor, has been extended and now has capacity for a 7,000-line switchboard. At the commencement of the installation of the new equipment a temporary screen was built round the working switchboard. Work was then commenced on the new sections and the following equipment installed:—The subscribers' board with accommodation for 2,900 subscribers' lines distributed over 32 "A" operators' positions, the incoming junction board equipped for eighteen "B" operators' positions each wired for 27 junctions, and the desk equipment described below. The usual practice of arranging the "A" operators' and "B" operators' positions on separate lines of boards has been followed. On the "A" boards the subscribers' lines are multipled once every nine panels and on the "B" boards once every six panels. The outgoing junctions are multipled once every six panels on both lines of boards.

In this connection it is interesting to note that when this equipment was designed a careful study was made to determine whether on this exchange, where 72 per cent. of the originating calls are outgoing junction calls, it would be economical to work the 28 per cent. local calls over transfer lines to the "B" boards and thus save fitting the costly subscribers' multiple over the "A" boards, Although at first sight it might appear that this would result in a saving, the actual figures, taking into account all the numerous factors bearing on the case, proved the contrary.

The switchboards are of the standard C.B. type.

The monitors' desk has the usual equipment and is at present arranged for four positions. Provision has been made, however, for another section to be added when required, bringing the number of positions up to six.

The exchange manager's desk is arranged in two positions in order to accommodate the manager and his assistant, and a single position desk is provided for the clerk-in-charge. Behind the sections is installed a special desk for the exchange inspector and a work bench for repairs to instruments, etc.

A photograph of the switchroom is shown in Fig. 1. This gives a good view of the subscribers' boards, the exchange manager's desk, and the clerk-in-charge's desk. The junction sections are seen rather less clearly in the right-hand corner.

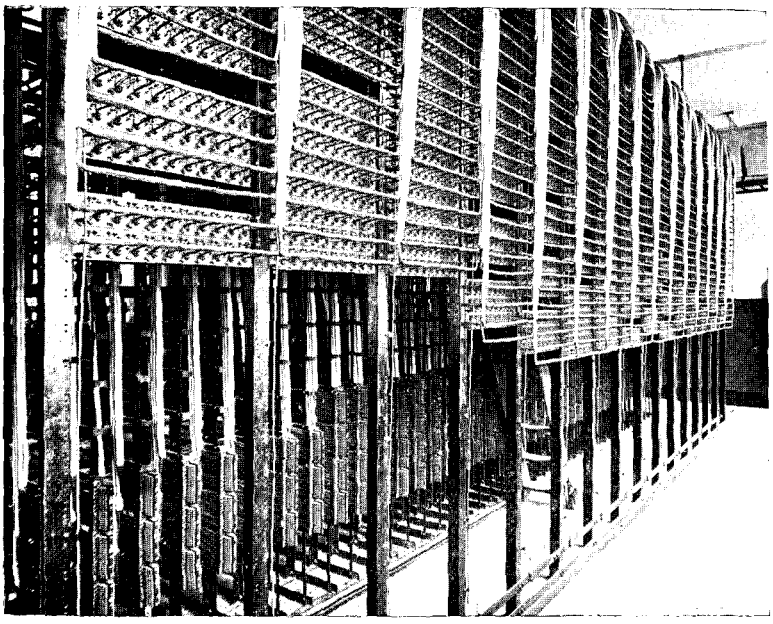


FIG. 2.

On the first floor and immediately beneath the switchroom are the operators' quarters, comprising sitting-room, kitchen, dining-room, and lavatory and cloakroom accommodation.

The apparatus room is on the ground floor. It contains the main distributing frame, the intermediate distributing frame and relay rack, and a fireproof cabinet containing the line resistance lamps. Between the main and intermediate distributing frames are located a standard two-position test clerk's desk and the fault clerk's desk This latter is arranged for two positions; it is similar in general design and construction to the test clerk's desk, but in place of the testing equipment there is a special card distributor for the instrument cards.

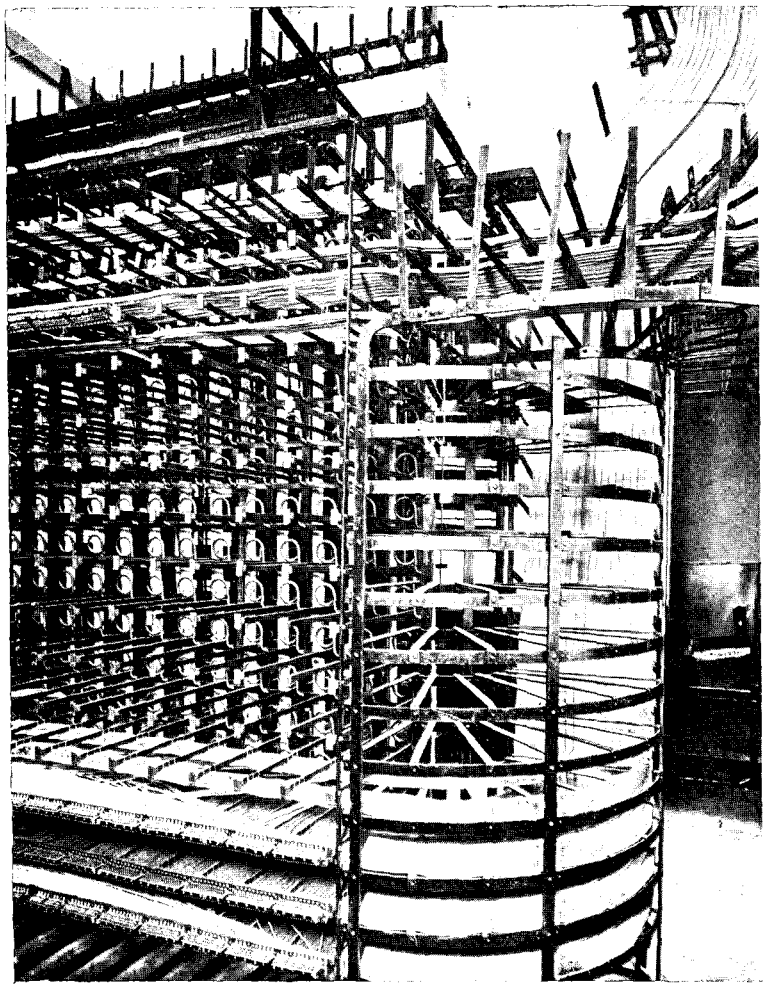


FIG. 3.

Figs. 2, 3, and 4 are three views in the apparatus room.

Fig. 2 shows the wiring of the line and cut-off relays and the vertical side of the intermediate distributing frame. Fig. 3 shows the horizontal side of the same frame, with the 63 wire cables leading up to the multiple on the switchboards. Fig. 4 shows the other end of the frame with the 42 wire cables from the main frame and the line resistance lamp rack. On this same view is also seen one of the travelling ladders. These ladders travel the whole length of the frame on steel tracks, and are found to be a great convenience when cross-connecting, etc.

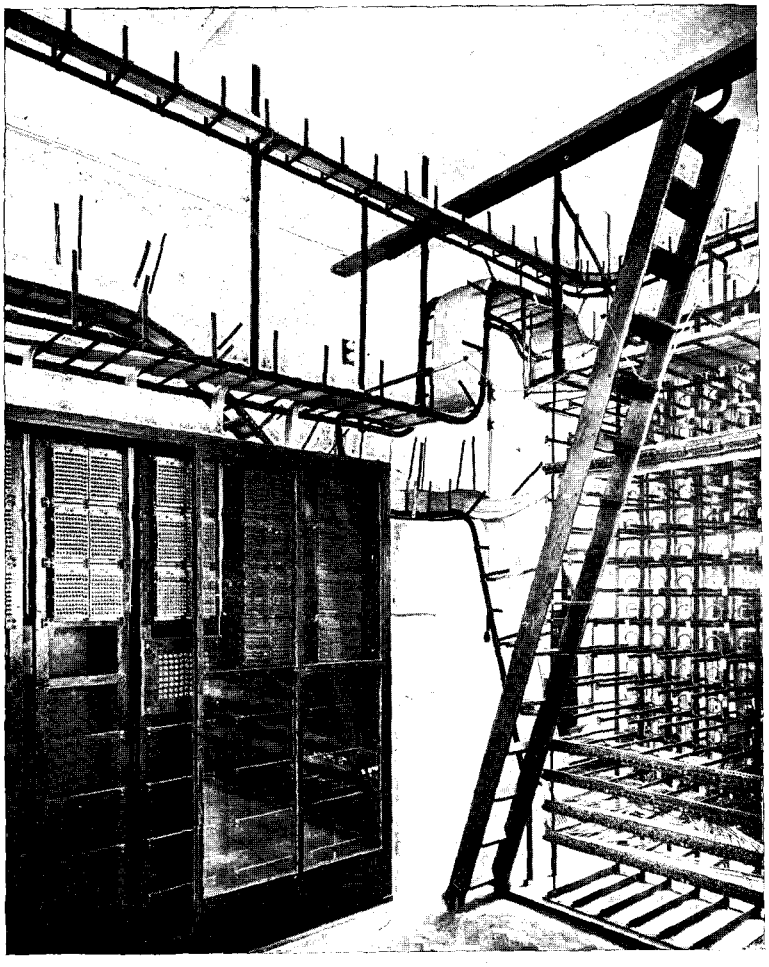


FIG. 4

The power plant is installed in a special power-room in the basement. The general arrangements can be seen from the photograph in Fig. 5. The plant consists of (1) a motor generator set driven off the 480-volt supply with an output of 300 amperes at 30 volts; (2) a 15 horse-power Crossley's gas engine driving a 300-ampere 30-volt generator; (3) a 150-watt ringing dynamotor driven off the 24-volt battery; (4) a 150-watt ringing motor generator driven from the 480-volt supply; (5) a 1 horse-power motor compressor used in connection with the underground cables; (6) a power board carrying all switches and controlling apparatus in connection with the foregoing.

In the same room as the power plant is installed the repeating coil rack and fuse board, and the condenser rack.

The accumulators are located in a smaller room adjoining the power-room. There are eleven cells, with a present capacity of

2,115 ampere hours, in lead boxes, with an ultimate capacity of 3,699 ampere hours, and four cells in glass boxes, with a capacity of 360 ampere hours, for working the service registers. The cells

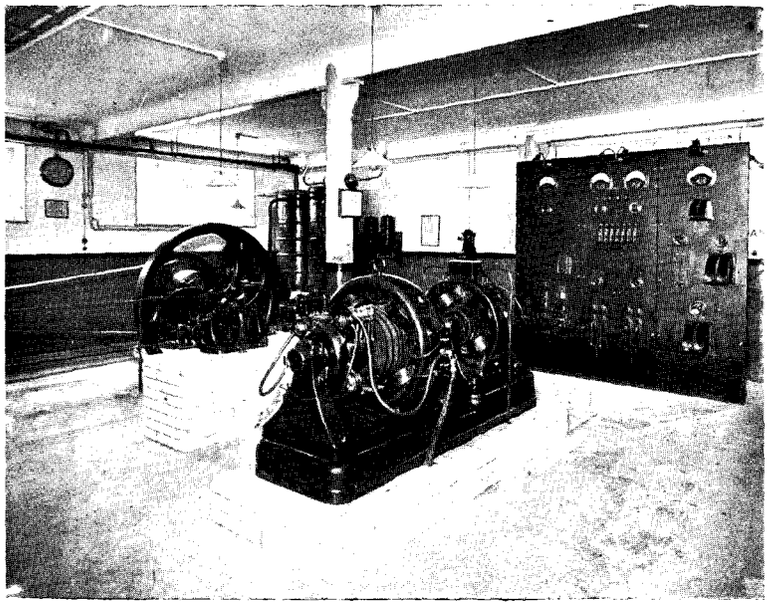


FIG. 5.

are of the Chloride Company's new type, specially designed for telephone work.

The completion of the exchange brings the total of the Company's common battery plant in London up to eight exchanges, with a total equipment for 28,000 lines.

EFFICIENT CONTROL OF INSTRUMENT STAFF.

By T. B. SALMON, *Derby*.

THE following methods which were adopted by me while chief inspector at Leicester, may be of interest to those engaged in maintenance work:—

The town was divided in areas, each area being planned out so that it was served centrally by tram routes.

Areas were not arranged so that opposite sides of a street were in different areas, as if this is done it is troublesome to determine the area in which a fault in such a street belongs.

An inspector was allotted to each area and made responsible for all instruments in that area, and to enforce this responsibility it was required that he should deal with all faults in his area himself, as far as possible; also that he should carry out the inspections in his area himself, or that they should be carried out under his supervision.

In order to bring the responsibility of each inspector home the following methods were adopted:—

Each inspector made a summary on his daily time-sheet of the instrument faults in his area for the day, and also of faults in any other area which he may have had to deal with.

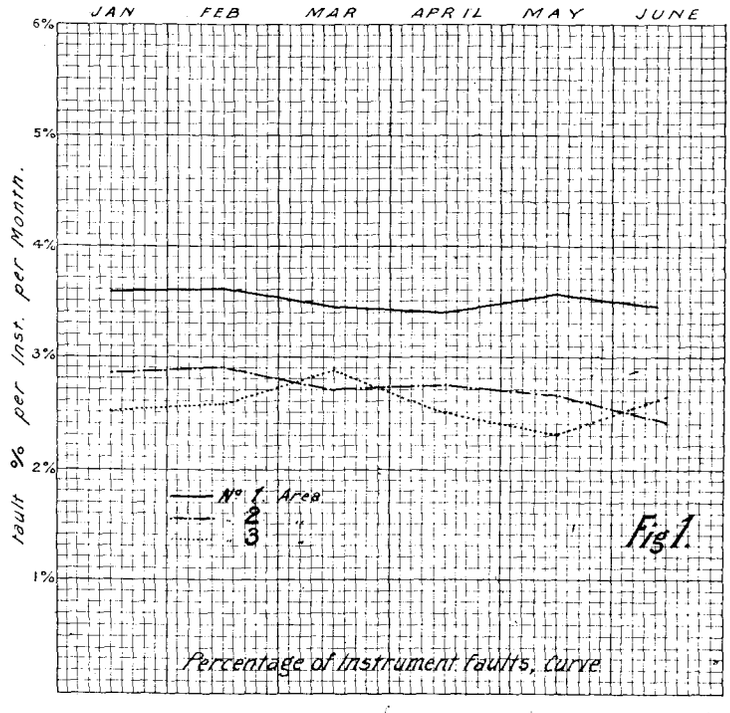
These particulars were jotted down in a book and checked with the fault cards for the day and at the end of the month the faults in an area were added up, and the percentage of faults per instrument determined. These percentages were shown by curves as in Fig. 1, and were exhibited in the inspectors' room, so that inspectors were encouraged to compete with one another. The man having the lowest percentage of faults was taken to be doing his work in the most satisfactory manner, other things, such as average use and age of instruments, being equal.

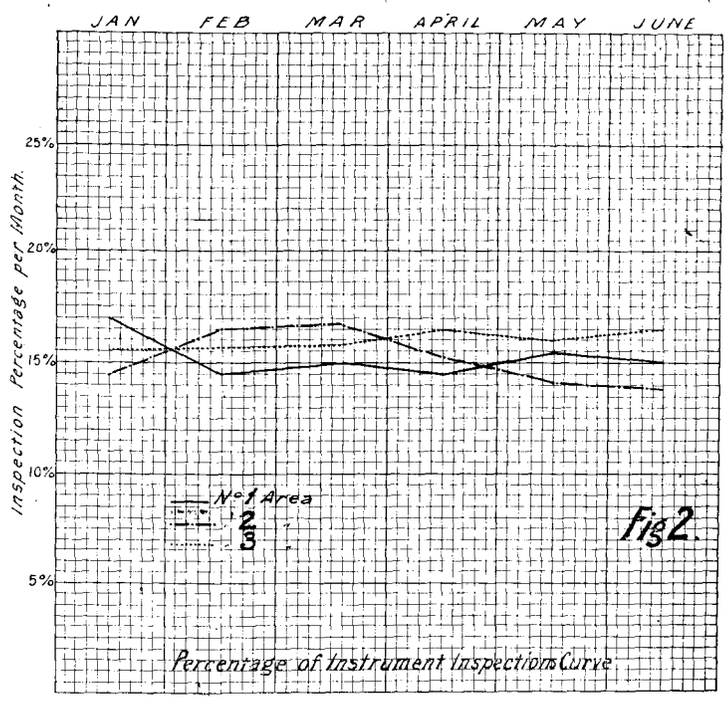
A summary of inspections made by each inspector was also noted on time-sheets and recorded as before, and another curve, Fig. 2, made, showing percentage of inspections in a similar manner to the fault curve.

Each area was represented by code lines on the curves, for instance No. 1 area, full black line; No. 2, dotted black; No. 3, red and black, and so on.

By instructions from the district manager, any subscriber having two or more faults in four weeks was entered on a special sheet which was fixed in a frame in the testroom.

If all faults shown against a subscriber's line were instrument faults the matter was taken up with the inspector responsible, in a suitable manner.





To ensure cells being kept in good condition, at each inspection cells had to be tested on the "quantity" coils of the galvanometer (tests on "intensity" coils not being of much value), and the results entered on the battery card.

Inspectors were not allowed to pass cells showing less than 0·6 amperes, as this was found to be an average figure for cells in fair condition. Galvanometers were tested weekly and the deflection corresponding to 0·6 amperes ascertained by connecting

the galvanometer in series with an ammeter and allowing a current of 0·6 amperes through the circuit.

In passing, it is worth noting that a convenient pocket ammeter can be made from a pocket cell tester (or so-called voltmeter) of the fixed coil type, by unwinding the fine wire of the coil and rewinding with thick wire: about 22 gauge will usually serve.

Frequent checks of battery tests and of inspections generally were made by the chief inspector. In cases where an area inspector had an assistant carrying out inspections, the senior was required to give in a weekly report of all check inspections made by him.

The adoption of the above methods resulted in a large decrease in the percentage of faults and in better service generally.

CORRESPONDENCE FILING.

By W. HAIMES, *Contract Agent, Nottingham.*

THE articles which have appeared in the JOURNAL on this subject are most interesting, but tend to confirm an opinion held for some time, viz., that throughout the Company's organisation there is in the dealing with correspondence a decided lack of uniformity, to the detriment of the business. Many officials upon taking up duties at a new centre have, I am sure, experienced inconvenience through unmethodical and antiquated systems of filing being in use. In many centres the correspondence is filed alphabetically in Amberg and Shannon cabinets; in others numerical systems, good, bad or indifferent, are in vogue. In certain district offices, coming under the classification of large centres, each letter is filed simply in numerical order, according to its register number, and much time is wasted and irritation caused in hunting through perhaps dozens of cases to complete a file of correspondence. Often the indexing and registering are very inferior, and I have met with more than one case where no indexing whatever was done. At these places, upon a file of papers being required, the entries in the Letters Received Register for a few months back were scrutinised, taking up half an hour or so, and the dates and numbers of the letters concerned were noted, and the correspondence, after wading through several cases, was turned up—sometimes.

The system described by Mr. PRENTICE in his very clear article appearing in the August JOURNAL must be a most excellent one, but for provincial offices I fear the expense would be prohibitive. For the provinces a system is required suitable for all concerned, and having in addition to reliability the advantages of simplicity and economy. In the hope that it may prove helpful to some, the following description is given of a system which has been thoroughly tested under varying conditions and found satisfactory. Several of the points have been touched upon by previous writers, but I have considered it best to make the description as complete as possible.

All incoming letters are entered in the Letters Received Register; each entry is allotted a number.

The number allotted to the letter which originates the subject serves as the reference number for all subsequent correspondence relating to the same.

An extra column is provided in the Letter Register in which is noted the reference number.

For the reasons hereafter mentioned it is advisable to begin a fresh series of reference numbers each year. The year forms an affix to the register number, *e.g.*, 1,233 06.

A card index to reference numbers is kept; the cards are arranged alphabetically and are separated by means of guide cards. The alphabet is spread over 200 to 800 guide cards, the number varying according to the volume of correspondence. The time saved by a plentiful use of guide cards outweighs the small cost of the cards. Where cards cannot be obtained a book index will of course serve the same purpose, but as it is impossible then to keep the entries in strict alphabetical order much waste of labour is involved, and it is also very inflexible.

The files of papers are placed in order of reference number in Amberg transferred volumes. Each volume is furnished with a non-lettered Amberg index, and each leaf is numbered by hand 105, 110, 115, etc. In division 115 all files bearing reference numbers 111 06 to 115 06 would be placed. On the back of each volume is marked the highest reference number it is intended to take, *e.g.*, 125, 250, 375, 500, etc., and these volumes are arranged on shelves in numerical order. In a minimum of time a hand can be placed on the particular volume and the particular division in which any file of correspondence should be found.

It is advisable to start a fresh series of reference numbers each year, as owing to the growth of certain of the files from year to year they would become unwieldy, and the transferred volumes would become overcrowded, necessitating re-arrangement of both the volume and the index contained therein.

No papers are filed away unless the last letter on a file is marked "File" by the official responsible for dealing with the subject.

Letters awaiting answers are kept in pending files, and for these Amberg transferred volumes are again used. These are examined weekly and replies urged when necessary. In a district office separate pending files would be kept for the following:—

Head Office.
Provincial Superintendent.
One for each out-centre.
Other districts.
Public.

In the event of any file of papers being handed out to any member of the staff, a note is substituted on which is noted particulars of reference number, subject or name of correspondent, to whom handed, and date.

The indexing and selection of headings for subjects require considerable discretion. In the case of service memo.'s the letters are never indexed under the name of the sender, but invariably under the subject matter.

All correspondence with a subscriber relating to his business with the Company *as a subscriber* are indexed under his name. Should correspondence take place with a subscriber relating to other matters, however, such as a quotation for electric lighting, upon which there may be correspondence with other members of the public, then it is indexed under "Electric Lighting," and a cross reference is made on the subscriber's card index.

The official in charge of the indexing should be careful so to arrange the heading that it is indexed under the initial letter of the heading, and that the first word thereof is what may be termed the root or key of the subject. As examples, not "Creo. Poles," but "Poles, Creo."; not "Nottingham Audit, 1906," but "Audit, Nottingham, 1906"; not "Wayleave, J. Jones & Co.," but "Jones, J., & Co., Wayleave."

It will be noted that from the Letters *Received* Register the reference numbers are allotted, and so as to overcome the difficulty in regard to correspondence originated by the office, details of such letters are entered in the Letter Register in red ink.

When incoming letters are registered they are immediately attached to the previous correspondence, so that the person dealing with it has at hand the whole history of the matters for reference. This involves no additional labour, as the attaching of the letters to their respective files must be done sooner or later, and it is a bad practice, frequently indulged in, to answer letters without the complete correspondence at hand, as an important point may easily be overlooked.

Any district changing from the Amberg system to the system above described will experience but little inconvenience during the stage of transition.

If the indexing and filing receive the attention they deserve, I am quite of Mr. ENTWISTLE's opinion that the Letters Received Register could be safely abolished, except so far as cash remittances are concerned.

Inconvenience is sometimes caused by failure of correspondents to quote the reference number; some of the Head Office departments particularly are offenders in this respect.

A BULLET IN A CABLE.

IT has been reported to the Engineer-in-Chief during the month that a very curious thing has happened to one of our aerial cables situated at Hayling Island. The sheathing of the cable has been pierced by a bullet, and the bullet itself was found inside the cable at the place where the sheathing was dented. The cable contained twelve spare pairs and thirteen working pairs of wires. The singular point about it is that the bullet had cut through every one of the spare wires but had not affected a single working wire. The hole in the cable was noticed by one of the men who had been sent out to test one of the slings to see if any of them required renewing. The piece of sheathing and bullet were forwarded to the Engineer-in-Chief.

CORRESPONDENCE.

THE NEW FAULT CARD SYSTEM.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IN Mr. A. C. Godfrey's article on "Rental Registers and Fault Cards" in your last issue, mention is made of the difficulty in gaining full information of an installation on account of a separate card being used for each instrument or station. The idea of having a separate card for each instrument worked very well as long as the installations were made up of comparatively few stations, but with the growth of the business a modification in the system has become an absolute necessity. In inner London large installations are the rule and not the exception, and recently installations comprising as many as 500 stations and more have been added to the system. Under these conditions it was found that the space taken up by the card cabinets was very great and a considerable drag was put on the fault clerk through having to handle so many cards.

One of the greatest objections to the old system was the necessity of copying the particulars at the head of the card on to the new card every time one was filled up.

Another objection was that there was always a danger of the wrong card being taken out of the cabinet and endorsed. Trouble is invariably reported

Name ..... *Tele. No.* .....

Address .....

Description of Installation .....

Type of Answering Instrument .....

NO. OF EXTENSION.	POSITION AND TYPE.	INSPECTIONS.
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

FIG. 1.

under the exchange number, although in many cases it is the extension instrument at fault. In such cases the exchange card was taken out of the cabinet and when the clear was received from the inspector it was found that the fault had been cleared on the extension and the fault clerk had then to replace the exchange card, get out the card referring to the particular extension, or else enter the clear on the exchange card. Therefore, in order to get a true history of any circuits, all the cards comprising an installation had to be examined.

The difficulties in connection with the old system became so acute in London that suggestions for improvements were submitted to me from several members of the staff, and although none of these were in themselves practicable, they formed the foundation of a new system which was evolved at some meetings of the divisional electricians and myself.

Name ..... *Tele. No.* .....

Address ..... *Card No.* .....

DATE.	TIME.	HOW REPORTED.	NATURE OF FAULT.	GIVEN TO INSPECTOR.	TIME.	DATE.	NO. OF LINE OR INSTRUMENT AFFECTED.	CLEAR.	TIME.	DATE.	DURATION HOURS.

FIG. 2.

The proposed new system was duly submitted to Head Office and was in course of time sanctioned, and the system is referred to in Section C 3 of the service instruction book.

In this system there is only one fault card for each installation, and in those cases where an installation consists of more than one instrument an apparatus card is introduced, which is attached to the fault card. By this means there are only two cards in the card cabinet at the same time, instead of say 30 for an installation of 30 lines or instruments. When a fault card is filled up it is filed, and a fresh card labelled "No. 2" is attached to the apparatus card. The labour of re-writing the particulars of the apparatus is thus saved and the number of cards to be handled is very considerably reduced.

Fig. 1 shows the ruling of the apparatus card (Sch. 1,474) and Fig. 2 the ruling of the fault card (Sch. 1,474A).

The columns on the right of the card headed "Inspections" are intended to carry the dates of the half-yearly inspections. Each card should therefore last three years.

It is intended that the apparatus card be kept attached to the current fault card in order that the fault clerk may have before him the fullest information about the installation with which he is dealing.

With this system the whole history of an installation is very readily seen and I feel sure that when it is introduced into Liverpool the difficulties mentioned by Mr. Godfrey will be considerably reduced.

G. F. GREENHAM.

A FIFTY-YEAR OLD CABLE.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

DURING the course of excavations for pipe laying for our underground scheme, the contractors came across a conduit containing G.P. wire. The conduit or boxing was made of malleable iron after the style of the present wood electric wire casing, with this difference that the top portion had flanges on the sides which fitted across the boxing. Inside the conduit was G.P. wire, which was in a marvellous state of preservation, the covering being quite good and the copper wire very fine and flexible. In fact it did not appear to have been any length of time in the ground. I forwarded a section of it to the Engineer-in-Chief, and he has advised me that this G.P. and covering formed part of the underground work for a line from Carlisle to Glasgow, laid down in 1853 by Reid Bros., London, for the Magnetic Telegraph Company, whose engineer was Mr. (afterwards Sir) Charles Bright.

After being 53 years in the ground it was really wonderful the state of preservation in which we found the G.P. and the copper wire.

JOHN L. WHITELAW.

TEAM WORK IN OFFICES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

The subject opened by Mr. A. Lynn, chief clerk, Dublin, in the August issue of the NATIONAL TELEPHONE JOURNAL, is one of deep importance and interest both to the Company and its staff. Appreciation and thanks are due to Mr. Lynn for his suggestions for the welfare and success of his fellow-men, also for the friendly advice given. As the motto of the NATIONAL TELEPHONE JOURNAL is "By the Staff for the Staff," I hope there is no objection to a few remarks of criticism.

The first paragraph of Mr. Lynn's article discloses a fact which does exist, if not in all district offices, at any rate in a good many; viz., what is termed "water-tight compartments."

But is the method advocated by the chief clerk at Dublin as to the ways and means of attaining success in the Company the wisest course to pursue? I think not.

Unfortunately, it is a well-known fact to-day, that if a privilege or a certain amount of license is given, especially to the young, in nine cases out of ten it is abused, or utilised in a way that was not intended.

The arguments adduced as to the necessity of gaining knowledge of the work of the various departments in order to become competent to fulfil a responsible position if called upon to do so are most convincing, but in my humble opinion to obtain a mere smattering of a certain department or work by looking over another man's shoulder is of not much good to myself and certainly not to the Company, besides making me a useless individual to my district manager. The question therefore arises, how and when is such knowledge as is required to be obtained? I frankly admit my inexperience as to the method or system by which the clerical work of the Company is carried on in the large districts, but I unhesitatingly say that in the district of Gloucester, in which office I have been stores clerk for over six years, that such a thing as a "spare half hour" is not known or experienced by any clerk on the staff. Further than this, I verily believe I may say without fear of contradiction that it is the same in all the district offices throughout the western province. Someone may ask me, "Have you no desire for promotion or advancement?" Most assuredly I have, but if I am appointed a stores clerk, or to any other position, it is my duty to devote my whole time and fulfil that capacity to the best of my ability in the interest of the Company. In order to do this a thoroughbred stores clerk can never lay claim to "a spare half hour," or avail himself of such advantages, perhaps, as are open to others holding other positions. It takes him full time and more to control his bookkeeping and see that the stores are kept under 1½. per station if he is to be of any intrinsic value to his district manager.

By all means let every man have an equal opportunity and fair footing, but upon legitimate and equitable lines. A man may be ever so ambitious, but if I endeavoured to find out how my district manager made out his weekly report to the provincial superintendent, or some other point of his work, I should expect to find myself thrown out of the office.

The chief clerk of Dublin states that in the days of his apprenticeship he very often had to turn on the electric light long after six o'clock. I may add that this is a continual occurrence with one or other of the Gloucester district office staff. In order to prevent giving offence to anyone I think if it were possible for measures to be officially adopted for a man to serve a certain period

in one department and at the expiration of that period if accomplished satisfactorily to be promoted to another department, this course would help to remove the discord which is somewhat prevalent. It is well for the man not to centre his interest entirely upon himself, but upon the Company, and we may one and all rest assured that the National Telephone Company will look after their hardworking and zealous staff.

S. G. HARE.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE letters appearing in the last few numbers of the JOURNAL on the subject of registering and filing correspondence have been very interesting, and several good points have been brought forward; I hope the following few suggestions will also be found of interest:—

The "pigeon hole" system suggested by Mr. Cooper is a very good one, but the objection to it is that correspondence is apt to get torn and untidy, owing to it having to be kept rolled, unless the "pigeon holes" are of exceptional size. In Reading, we have adopted the use of a set of baskets, in order to keep the papers flat, marked under various headings to suit the local requirements. For instance, we have three baskets for "General" matters, arranged alphabetically, one basket for "Urgent" matters, two baskets for "Special" matters, *i.e.*, new exchanges, underground schemes, etc., and one basket each for the "General Manager, Stores and Wayleaves," "Solicitor's Department," "Provincial Superintendent," "Local Managers," and "Quotations."

Letters received are entered in the letters received book and indexed, and the carbon replies are also indexed. Mr. Entwistle suggests doing away with the Letters Entry Book, but I think this book should really be kept in use as a strict register of all letters received, but seeing that the carbon replies are indexed, the indexing of the Letters Received Book could be done away with, as a reference to the carbons index book would at once give the date on which the letter was received.

Under heading No. 5, Mr. Entwistle suggests a separate register for cash received. It is the system here that all general letters are entered in one register, and the cash in another, one clerk dealing with each register. In the case of a letter being received enclosing a cheque, which also refers to a subject matter, the clerk dealing with the cheques initials the amount mentioned on the letter; the letter is then passed to the clerk to enter in the Letters Received Book. A third book is also kept for the entering of Company letters.

The correspondence clerk and two juniors report for duty at 8.30, and by the system mentioned above all letters are entered and ready to be dealt with by the various members of the staff by nine o'clock. An extra half-hour at lunch time is allowed to the correspondence clerk and the juniors reporting at 8.30 a.m.

With regard to the arrangement of the correspondence, each officer in the district office is allotted a number, the District Manager being No. 1, Chief Clerk No. 2, and so on, and these numbers are quoted on the correspondence instead of the number given to a letter after being entered in the Received Register. This system is found to be of greater advantage than giving the letter number reference. When letters are received, they are distributed to the various numbers quoted, and the clerk the matter refers to is able to deal with the matter at once.

The system of filing correspondence here is as follows:—We have an Amberg case each for the "G.M. & W/L.," Sols., Secy., Supt., E.-in-C., Stores, one for each Local Manager, one "Other Districts and Notts Factory," also one separate file for general letters. The carbon copy of the reply is attached on top when filed, so that in the case of a letter being wanted, a reference to the carbon copy index book will give the date of the reply, and this will be the date under which the letter is filed, thus making the carbon copy index book a register of letters filed. This method is adopted even where several letters have been exchanged, as the latest date is always on top, and where correspondence accumulates into bundles, a separate register is kept for these. This is arranged as follows:—A foolscap book is cut through alphabetically, and these headings used:

Name.	Subject.	Date Filed.	Where Filed.

The fact of keeping the latest date on top keeps the correspondence up to date, and when the time comes for filing, they are put into current file boxes. In the case of large bundles, such as new schemes, etc., a special set of boxes is kept, numbered serially, and a note made on the inside of the box of the contents, in case anything happens to the register.

This system has been in use at Reading for the past eighteen months, and the method of keeping the carbon copy on top and using the carbon index book as a register of letters filed has been found to be of great assistance in the turning up of letters wanted.

J. H. DAVIE.

Reading, August, 1906.

BENEVOLENT AND PROVIDENT SOCIETY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I AM glad to see that Mr. Clay's suggestion to organise a benevolent fund meets with such good support, and I second Mr. Hare's proposal to include the whole of the staff. I feel sure the major part of the staff sees the need of such a society, and would be only too willing to contribute a penny per week towards such a good cause, for in a concern so widely extended as that of the National Telephone Company, whose branches are spread over the whole of the kingdom, it cannot be concealed that among the 16,000 employees there are many who, perhaps from circumstances of unforeseen misfortune and calamity, are reduced to the lowest state of poverty and distress. It is those we are all anxious to assist.

Portsmouth. J. H. YATES.

WHY TELEPHONE SERVICE IS GOOD FOR SHOPS.

AN interesting case in the Germantown district shows the possibilities of telephone service as applied to a moderate-sized grocery or provision store.

MITCHELL, FLETCHER & Co. have a store on Germantown Avenue which commands good local patronage. Less than a year ago an intercommunicating (or No. 2 Branch Exchange) system was installed, the contract being secured by Mr. FEHLING. A system of telephone sales was instituted, the complete list of customers being called on the telephone every morning. A number of men who had been maintained to travel around and take orders were transferred to other work, as the telephone had taken their place. New residents were interviewed and the plan explained to them, this being the strongest kind of help to us in calling the attention of new residents to the service.

Soon, however, the equipment proved inadequate, and the service was increased to a No. 1 Branch Exchange with four trunks, twelve stations, and 20,000 calls. The manager of the store recently stated to Mr. FEHLING that this telephone equipment HAD INCREASED THEIR SALES 50 PER CENT.

A window display is soon to be made, calling attention to their telephone equipment and urging subscribers to try their telephone order plan.

This store is not more than 25 by 60 in size, and resembles very closely the first-class grocery store generally to be found in every good-sized town. Its area of patronage probably does not exceed three miles in radius, which is probably less than the usual field, and its patrons are very frequently *not* on local flat service, which makes every message cost the subscriber something. Yet they have *increased their sales 50 per cent. by means of the telephone.* This case applies exactly to twenty or 25 stores in our territory that now have a direct line only, or, possibly, only a pay station.—*The Telephone News*, Philadelphia.

A TWENTIETH CENTURY "VIVA VOCE."

BY J. S. RHODES.

PRECEDENTS are easy to follow, but it requires boldness and judgment to create successful ones. The examination authorities of Oxford University are therefore to be congratulated upon having the courage to use up-to-date methods in dealing with a recent case of a decidedly perplexing character.

An undergraduate of the University had undergone his examination for the degree of Bachelor of Arts, with the exception of the *viva voce* portion. He was unable to take this, in consequence of illness which overtook him at his home in Birmingham. The difficulty was bridged, however, by means of the telephone, which, under the circumstances, the Vice-Chancellor of the University consented to use for the purpose of the *viva voce* examination. A special arrangement was made with the Post Office authorities whereby an extension of time was granted to a ten minutes call between 1.30 and 2 p.m. for the use of the trunk wires between Birmingham and Oxford, and in this time the invalid had passed his examination satisfactorily, the questions being asked at Oxford and answered by him in Birmingham. It should be mentioned that a Master of Arts of the University was with the undergraduate during the time he was using the telephone, so that no question could arise as to the fairness of the examination.

ANOTHER RESCUE FROM DROWNING AT JERSEY.

ABOUT half-past six on July 9, a soldier of the East Surrey Regiment had a somewhat narrow escape from drowning, being badly seized with cramp soon after leaving the raft moored about 100 yards from the bathing place known locally as "the flats." Luckily two members of the staff, Messrs. B. Gregory and C. Juhel, were bathing not far from the scene and swam at once to the rescue, and managed, not without difficulty and with the aid of the lifebouy provided for use in such emergencies by the Jersey Swimming Club, to get the man safely ashore.

NEWS OF THE STAFF.

London Traffic Department.—*Promotions and Appointments for August.*

Miss A. HENSHILWOOD, Operator, Avenue Exchange, to be Supervisor, Bank Exchange.

Miss H. LEWSEY, Operator, Paddington Exchange, to be Supervisor, Westminster Exchange.

Mr. A. DOWLING, late Night Clerk-in-Charge, Kensington Exchange, has been appointed Observation Clerk at the observation office, London Wall Exchange.

Resigning to be married:

Miss A. BAUGH, Supervisor, East Exchange.
Miss G. TYLER, Supervisor, East Exchange.
Miss A. PICTON, Operator-in-Charge, Woolwich Exchange.
Miss M. E. BURTON, Operator, Hop Exchange.
Miss L. CLARK, Operator, Holborn Exchange.
Miss E. DARRINGTON, Operator, Avenue Exchange.
Miss A. DUTNALL, Operator, Bank Exchange.
Miss G. GILBERY, Operator, North Exchange.
Miss M. GOULDSTONE, Operator, Avenue Exchange.
Miss A. HANSELL, Operator, Hampstead Exchange.
Miss B. HAWKESWORTH, Operator, Croydon Exchange.
Miss R. HARRIS, Operator, Westminster Exchange,
Miss E. LEYBOURNE, Operator, Gerrard Exchange.
Miss J. STEPHENSON, Operator, Gerrard Exchange.
Miss E. WALSH, Operator, Bank Exchange.
Miss F. M. WENN, Operator, Avenue Exchange.

Mr. H. E. REIMANN, of the Correspondence Department, Salisbury House was married on Aug. 11 at St. Saviour's, Peckham. He was the recipient of a handsome roll-top writing cabinet from his colleagues and friends.

Northampton Institute, Technical Classes, 1905-6.—The following members of the Head Office and Metropolitan staffs are to be congratulated upon their success in passing the City and Guilds Examinations:—1st class Honours (Telephony): C. E. Crouch, J. Jenkins, and F. W. Woodman (Metropolitan). 2nd class Honours (Telephony): A. Grew and J. McLeish (Metropolitan). 1st class Ordinary: H. G. Bishop (Head Office), G. E. Geisler, E. Layton, D. McCall, J. H. Patman, E. Robinson, W. E. Smith (Metropolitan). 2nd class Ordinary: A. Bines (Metropolitan), C. D. Cann (Head Office), H. Gould, R. W. Gregory, W. H. Griffiths, J. H. Johnson (Metropolitan).

Mr. H. MISSEN, Inspector on the Eastern Maintenance staff, was presented with a walnut overmantel by his friends and colleagues in the district on the occasion of his marriage, which took place at St. John's Church, Stratford Broadway, on Aug. 11, 1906.

Inspectors F. RATCLIFFE and W. HIGSON, of Bolton, passed 1st-class (Honours) in connection with the City and Guilds Telephony Class. Higson sat in connection with a Manchester class, and it is believed that only two obtained 1st-class Honours.

Mr. H. JULIUS MACLURE, Contract Manager, Brighton, has just been promoted to be Contract Manager at Birmingham. He joined the Company's service at Head Office on Nov. 1, 1893. Nearly two years later he became Chief Assistant in the Stores Department, where he remained until Oct. 15, 1903, at which time he was appointed Contract Manager at Brighton.

Mr. A. SIBERRY, Local Manager, Swansea, has been transferred to Newport (Mon.), and Mr. R. WILLIAMSON, Local Manager, Newport (Mon.), replaces Mr. Siberry at Swansea. Mr. Siberry was presented with a handsome *epergne* on leaving by Mr. George Hey on behalf of the staff, and Mr. Williamson was presented by the local staff with a silver kettle and stand, and Mrs. Williamson with a silver sugar basket and spoons.

Mr. F. J. FROST, Traffic Manager, Brighton, has entered the bonds of holy matrimony, and the staff has presented him with a brass curb and furniture, a wicker easy chair, and a Gladstone bag.

Mr. S. C. FOSTER, of the General Manager's office, was married to Miss Jessie Feaver, of South Norwood, on July 28. He was presented by his colleagues with a Gladstone bag and cutlery.

Mr. W. BEATTIE, late of the Barrow district staff, has been promoted to the Local Managership of St. Helens. He joined the service as a junior clerk in 1898, was transferred in 1902 to the Instrument staff at the Kendal centre, and in January, 1905, was promoted to the position of Chief of the Engineering and Electrical Departments at Barrow.

Mr. R. W. BELL, late Local Manager at St. Helens, has been promoted to the Local Managership of Rochdale; prior to going to St. Helens Mr. Bell was for some time Local Manager at Watford and afterwards at Portsmouth. He joined the service in 1894.

Mr. JOHN A. SWANSON, district office, Edinburgh, was married on July 27.

Mr. GEORGE GALLOWAY, complaints office, Edinburgh, was married on Thursday, July 26.

Miss E. FLUCKER, Junior Operator, Leith, has resigned in view of her approaching marriage.

Miss N. EVANS, Clerk-in-Charge, Oldham Exchange, on the occasion of her leaving the Company's service to be married, was presented with a case of cutlery and a pair of salt cellars subscribed for by the Oldham staff.

Mr. J. E. GREENWOOD, Inspector-in-Charge, Brighouse, has been promoted to Inspector-in-Charge, Beverley.

Mr. H. HANSON, Inspector, Huddersfield, has been promoted to Inspector-in-Charge, Brighouse.

Mr. J. H. HALL, Cost Clerk, West Yorkshire district office, has been presented with a case of cutlery by his colleagues on the occasion of his marriage, July 18 last.

Miss E. ADAMS, Monitor, has been promoted to be Teacher of the new School for Operators, Birmingham.

Miss K. BARNETT, Miss L. CASH, and Miss F. LAMBERT, have been promoted to Supervisors at Birmingham.

Miss M. BILLINGTON has been appointed Monitor, Birmingham.

Mr. K. WARREN, Inspector, Dudley, has been transferred to Leicester in same capacity.

Miss E. GURNEY, Operator, Long Eaton Exchange, has resigned to be married.

Mr. H. M. POPE, stationed for some years at Torquay, left on July 20 to take up position as Assistant Engineer at Swansea.

Manchester Staff.—The following successes were obtained by members of the Manchester district staff in the City and Guilds Examinations in Telegraphy and Telephony, held in May last:—Telegraphy and Telephony, Ordinary: W. Crompton (1st class), W. Myers and R. Jackson (2nd class). Telephony, Honours: B. Standen, H. Green and H. Wood (2nd class).

Inspector RYLAND, Cheltenham, has been transferred to Stroud. He was presented with a kit-bag by the local office. A. T. TAYLOR (local office) has been appointed Inspector, vice A. E. Ryland.

Inspector E. EDE, Sheffield, was married on Aug. 6.

The following members of the Sheffield staff have passed the City and Guilds of London Institute Examination in Telegraphy and Telephony:—E. S. Byng, Honours Grade, 1st class; A Podmore, Ordinary Grade, 2nd class.

Miss E. MCCANN, Senior Operator, Dublin, has been promoted to the position of Supervisor.

J. HARRISON, Instrument Inspector, has been transferred to Manchester.

Mr. A. MORRICE, Register Clerk, Dundee, was on the occasion of his marriage, which was celebrated on Aug. 15, presented with a handsome marble clock subscribed for by the staff in the district. Mr. W. Brown, District Manager, made the presentation.

Miss AGNES SUTHERLAND, Senior Operator, Douglas Exchange, Glasgow, resigned on July 26 on the occasion of her marriage. Before leaving she was presented with a dinner service on behalf of the Operating staff, whose good wishes she carried with her.

A. LLOYD, General Manager's Office, was the recipient of a marble clock from his colleagues on the occasion of his marriage on the 25th August.

STAFF GATHERINGS.

Brighton.—On Saturday, July 21, the Engineering staff held its annual outing, journeying in chars-a-banc and carriages to Cooksbridge, *viâ* Hassocks and Ditchling. Mr. F. W. Roberts, Local Manager, and Mr. H. Legge, Engineer, accompanied the party. At Cooksbridge was served a substantial dinner, which was presided over by Mr. F. W. Taylor, District Manager. The opportunity was taken by the chairman to present, on behalf of his old colleagues, a smoker's touring companion to Mr. J. H. Watkins, late Assistant Engineer at Brighton, who has recently been promoted to the Engineer-in-Chief's Department. Mr. Watkins briefly responded. Thanks to the generosity of the local directors, provincial superintendent, management and friends, a substantial list of prizes was competed for in the afternoon, excellent sport being afforded by the various races, tugs of war, jumping, etc.

Birmingham.—The Birmingham and district staff had their first cycle run on July 22 to the Lickey Hills. Between 30 and 40 members were present, and thoroughly enjoyed the outing.

Nottingham Factory.—The annual outing of the Notts Factory employees took place on Aug. 18, when a party of 150 journeyed by train to Bottesford and another party of 40 rode over on cycles. The sports were commenced immediately on arrival, and as the various events were well patronised the afternoon was fully occupied. Some of the events, especially the 100 yards (senior) and 440 yards, which were won by A. Smith and H. Collins respectively, were keenly contested. As usual the obstacle race and the three-legged race provided great amusement. The prizes were subsequently presented to the successful competitors by Mr. C. E. Fenton, the Factory Manager. After tea various games were played and a smoking concert was also held, the efforts of the various entertainers giving great satisfaction. The return journey was commenced at 10.15 after a most enjoyable time had been spent. In connection with the athletic side of life at the Factory it is interesting to note that Mr. D. Macadie, Chief Electrician, Notts Factory, on Saturday, July 14, without previous training cycled from Birmingham to Nottingham in 2 hours 35 minutes, being 25 minutes inside estimated time. The road is somewhat hilly, and as there are a number of towns *en route* the performance is remarkably good. Mr. H. Toplis, Cost Clerk, did the pacing on his motor cycle.

Croydon.—A match was played on Saturday, July 23, at South Croydon, between the National Telephone Company (Croydon centre) and the Croydon Corporation Cricket Club, resulting in an easy win for the former by 107 runs. The outstanding feature of the game was the fine all-round form shown by J. Thorpe for the National Telephone Company, who captured six wickets for twenty runs and hit up 64 runs without being beaten. The Company's total was 141, and that of the Corporation 34.

East Coast District.—*Operators' Outing.*—On June 21, at 6 p.m., the Operating staff drove to Coltishall, where a pleasant evening was spent on the river. Supper was afterwards taken, and the party returned home by road, well pleased with their experiences.

Norwich Male Staff (Indoor).—The combined staffs of the district, local, and contract offices (numbering 42), accompanied by the District Manager, had their first outing on June 23, the venue being Coldham Hall, which is situated on the banks of the Yare, where the party was joined by some members of the staffs at the Yarmouth and Lowestoft centres. The motor launch "Doris" was chartered for the journey. A capital programme of sports was indulged in, comprising swimming, boating, bowls, tugs-of-war, running, walking, cricket, football, throwing the cricket ball, kicking the football. Forty-six sat down to tea. A photograph of the party was taken, and a concert was held on board on the return journey. It is expected, as the result of this departure, a sports club and a telephone society will be formed in the near future.

Sheffield.—A cricket club has been formed to be in readiness for next season. The subscription is to be 6*s.* for the first season, which it is hoped will be reduced after the preliminary expenses have been met. Will the secretaries of neighbouring clubs please note that all dates are open, and communicate with the Secretary, Mr. A. Podmore, as it is desired to arrange matches with the surrounding districts.

WHAT THE COMPANY IS DOING.

Two exchanges were opened during the month of August, bringing the total number up to 1,248. They were Crossgates (Leeds district) and Southwell (Nottingham).

The net increase in stations during July was 2,790, making a total of 389,413.

LONDON.—*Great Western Hotel, Paddington.*—A private branch exchange, consisting of 160 stations on the common battery principle, was opened on Monday, July 9.

The building for a new common battery exchange at *Hammersmith* has just been commenced, and the specification for the exchange equipment is in hand.

Nearly one mile of duct has been laid at *New Wanstead.*

Orders for 476 and 232 metaphones respectively have been supplied to the Admiralty.

NOTTINGHAM.—The trenching work in connection with the underground cable between Nottingham and Beeston exchanges, and also for the underground scheme for Beeston, has been put in hand and is making good progress.

Nearly one and a half miles of the three miles of duct to be laid at Bulwell, Nottingham, has been completed.

BIRMINGHAM.—A School for Operators has now been started for Birmingham district. This is the first one in the provinces to be officially instituted.

A start has been made with the necessary trench-work to provide 96 new distributing poles in Birmingham.

BRIGHTON.—The conversion of the Brighton switchboard to the common battery system is now nearly complete, together with the installation of meter records. The latter are also working at Hove Exchange.

SWANSEA.—The Company is going in for extensive aerial cable extension here to meet the large growth of business. The switchboard extensions at Swansea Exchange are nearing completion. These have been in hand since November last. The district, local, and contract offices of the Company have been removed to more commodious premises at Coleridge House, Mount Street, and testroom and operators' retiring rooms have been extended at the old building.

SCARBOROUGH.—The new common battery equipment (No. 9 type) for 600 lines was brought into use on July 29.

BRISTOL MUTUAL BENEVOLENT SOCIETY.

BRISTOL has just formed a society on somewhat similar lines to that of London, with the addition that it shall also be run as a slate club, winding up each year, the proceeds from subscriptions, fines, etc., being divided equally between the members. The weekly subscription is 3*d.* and the annual entrance fee 1*s.*, the entrance fees being retained to form a distress fund to provide for cases which are not covered by the benefits of sick pay, etc. The sick benefits are at the rate of 9*s.* per week for five weeks and 4*s.* 6*d.* per week for the next five weeks. In the case of death a levy of 1*s.* per member will be raised, the proceeds from this, not exceeding £10, to be paid to the widow or other authorised person. The membership at the moment is 200. Mr. Dalzell, the Superintendent, has been requested to act as president of this society. The committee of eleven has been appointed, with Mr. Perkins as its chairman. Mr. J. T. Smith, Chief Clerk, will act as honorary treasurer, and Mr. E. Seymour Cooper as the secretary.

HIC ET UBIQUE.

THERE would not at first blush appear to be much connection between numismatics and telephone call boxes. However, in maritime places where strange people come up from the sea in ships, strange coins find their way into the slot.

The Hull office, we are informed, possesses specimens (all obtained from one automatic call box) of the coinage of the following countries:—Germany, Greece, Roumania, Sweden, Spain, Chile, Italy, Austria, France, Cochin-China (French State), Argentine Republic, Uruguay, India, Japan, Guernsey and Jersey, also a counterfeit two-shilling piece and sundry metal discs.

VAGUE ideas prevail as to the present development of long-distance telephony. The lady who called at the York Exchange call office and modestly requested "to telephone a few words to India" had, we regret to say, to be sent empty away.

THE legitimate complaint of the subscriber naturally grieves us and incites us to immediate remedy; but when a non-subscriber goes to a tradesman and asks for the loan of his telephone to *order goods from a rival tradesman*, and, being refused, makes a complaint to the Company's office, words fail us. To prevail with these souls of brass, words of brass—volcanic adjectives not in our vocabulary—are necessary.

THE ancient rustic who has never seen a telephone before is always with us. Lately he appeared at a Welsh call office, and was put into communication with a timber merchant, who made the usual enquiry: "Are you there?" The caller merely nodded, and, after the third inclination of the head, bawled: "Can't you see I am here?" "What do you want?" enquired the merchant. "Wood," said the ancient rustic. "What length?" "This much," was the reply of the A. R., dropping his hand-set, and extending his arms to indicate the desired length of wood. As the merchant failed to understand what was going on, the caller quitted the box in disgust, and it was left to the attendant to impress on his receptive mind that unlike little boys who must be "seen and not heard," the telephone user is "heard and not seen."

"A LITTLE knowledge is a dangerous thing." One of the Company's district managers has received a letter from a subscriber asking that his telephone may be removed from the second to the first floor, as an inspector had informed him that the resistance was "too high."

A MEMBER of one of the Company's electrical departments tells a story of a subscriber who rang him up saying that one of our men was tinkering about his desk and annoying him very much. The official replied, "Tell him to leave and he will do so at once." To his astonishment, however, an hour later another ring came and a message to the effect that the man would not leave, taking no notice of anything that was said to him. Greatly amazed, the official hurried round to the subscriber's office and anxiously enquired of one of the clerks for the man whom he was to remove. "Did the governor ask you?" enquired the clerk, and on receiving the reply "Yes," said, with a significant jerk of the thumb over his shoulder, "It is all right; he's got 'em again." "'Em" was understood to refer to alcoholic hallucinations.

AN anonymous correspondent has forwarded to us the following "Imaginary Conversation," which, with duly chastened mind, we reproduce:—

Energetic Salesman: Yes, sir, intercommunication telephones are a most wonderful invention. Simply indispensable as a time-saver—hours daily gained and every man at his desk when required.

Prospective Customer: Seems all right. Selling many?

Salesman: Hundreds weekly. All up-to-date establishments have or will have them in a couple of weeks.

Prospective Customer: I'd like to see them in use, and will call at your offices to see your company's installation.

Salesman: Sorry, sir, but we don't use them. You see largely the company are philanthropists in giving their advice gratis, but they prefer not to apply their superior knowledge in intercommunication systems to the betterment of their own business.

This gentleman, however, has but an imperfect conception of the proper function of an intercommunication set. Intercommunication telephones are no doubt very useful up to a point, but they are not comparable either in convenience or efficiency with a private branch exchange or with a system of exchange lines to every department such as is found in all the Company's principal offices—and the prospective customer should always be persuaded to have one of the latter rather than become the purchaser of an intercommunication set.

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TELEPHONE MEN.

V.—SAMUEL HERRICK SANDS.

MR. SANDS, the Vice-President of the National Telephone Company, is one of its oldest Directors, having in 1881 joined the Board of the National Telephone Company, Limited (previous to the amalgamation). The only other survivor of the "National" Board of those days still on the Company's directorate is Mr. WILLIAM ALEXANDER SMITH, of Glasgow. The Company's operations were in those days confined to Scotland, North of Ireland, Cumberland, Lincolnshire, Yorkshire, all the Midland counties, and the Potteries. Mr. SANDS personally took an active part in the opening of the exchanges at Nottingham, Leicester and other towns in the Midlands, and in the negotiations which led to the amalgamation with the United, Lancashire and Cheshire, and Northern District Companies, under the title of The National Telephone Company. Mr. SANDS was formerly a member of the firm of T. I. Birkin, Sands & Company, one of the most important lace manufacturing firms in Nottingham. He retired from business in 1879, and was elected a Director of the Nottingham Joint Stock Bank in 1880, occupying the office of Chairman from 1886 to 1903, and was greatly instrumental in carrying through the arrangements under which this Bank was amalgamated with the London City & Midland Bank in 1906. He is at present Chairman of the Nottingham Suburban Railway. Mr. SANDS' services to the Midland city were many and valuable, and he filled all the principal offices to which a citizen can aspire. He was elected a member of the City Council in 1886, occupying the position of Mayor in 1890, and becoming Alderman in 1891. He was Chairman of the Water Committee from 1893 to 1899, Chairman of the Stoke Farm Committee from 1890 to 1903, and Vice-Chairman of the Finance Committee for several years. His retirement from municipal work at the end of 1903, after seventeen years' connection with Nottingham evoked a unanimous resolution of regret from his colleagues, and many expressions of hearty appreciation. Mr. SANDS is still a Justice of the Peace for the city and also for the county of Nottingham.

Mr. SANDS was elected Vice-President of the National Telephone Company in 1905, having been for many years the Chairman of the Finance Committee of the Board. He was largely concerned in the establishment of the Company's Factory at Nottingham for the repair of switchboards, instruments and apparatus, which gradually increased until it became necessary to acquire premises outside Nottingham at Beeston, where a factory was started for the manufacture of telephone instruments. This Beeston Factory was ultimately taken over by the British L. M. Ericsson Company, Limited, and has now developed into a large manufacturing concern.

On the formation of the New Telephone Company under the Presidency of the late DUKE OF MARLBOROUGH, Mr. SANDS was one of the four Directors appointed to represent National interests on the Board of that Company, the whole of the shares of which the National Telephone Company ultimately acquired.

Despite his varied civic and commercial activities, he is a man of retiring disposition, and has never courted publicity.

Mr. SANDS is a keen horticulturist, but whether the climate of Eastbourne (to which place he has removed since he has given up active participation in municipal life in Nottingham) will be as favourable to the exercise of this taste as was Lenton, near Nottingham, is a matter which experience alone will decide.

THE SELECTION AND TRAINING OF OPERATORS.

BY MRS. B. M. PETERS, *Matron, Glasgow.*

THE ever-increasing number of subscribers and the consequent increase of traffic which necessitates the fitting of additional operators' positions to our switchboards and the increase of replacements due to the larger number of operators employed, have made the selection and training of operators matters of extreme importance. In the provinces, from whose particular point of view this paper is written, the subject must now be deserving of serious consideration.

In the Glasgow district these extensions and replacements have been very numerous during the past two years, and it was felt that some training of operators was most necessary before putting them to the switchboard.

Although we were not in a position to open a proper school, an arrangement has been made by which, to some extent, new operators are given theoretical and practical training at evening classes. These classes are held twice a week in two of the largest exchanges by the clerks-in-charge, and the lessons are of two hours' duration each, twelve being given in each class. Although in this way the instruction can only be limited, the results have been most satisfactory, and we feel encouraged to go on with them and look forward to the time when we may have a fully-equipped school.

In the engagement of operators the first thing to be considered is the range of selection, and it is necessary that the applicants' list should be a large one, from which they may be carefully chosen.

Girls who speak clearly and distinctly, with a well-modulated voice, who are well educated, and have a bright, pleasant manner and smart appearance should be satisfactory, and much may be gathered as to character and disposition by a few questions at a personal interview.

Applicants from sixteen to eighteen years of age are preferable to those older; sixteen seems young, but if the right type of girl can be got, it is better that they should have had no previous business experience or training, as they are more adaptable and more easily moulded into what is required of an operator, and this is more likely at sixteen than seventeen.

All applicants are sent to the Company's medical officer to be examined, and if passed by him are put through an educational examination.

During this examination candidates should be carefully watched and those who show slowness in their writing and movements generally should be specially noted and this remembered when going over their papers. Quickness of action should also be noted and taken into consideration where a candidate's papers are perhaps a little doubtful, as this quality is so essential in an operator.

The reading over the telephone of a few short paragraphs in which exchange names and numbers are introduced, will also be a further guide to the clearness and quality of the voice. These attributes when speaking directly with the candidate may appear satisfactory, but over the wire may be otherwise.

Introdu tory Lecture.—On entering the evening class each learner, after being enrolled, should be given a book of "Rules and Regulations," also a note-book in which, from time to time, she should make copious notes from the lectures. On the first evening, learners should be told that the training they are to undergo is to make them capable and efficient servants of the Company, whose relation to its subscribers is that of a public servant and it must therefore follow that only those who give their whole attention to the instruction and training given will be successful. The necessity for personal neatness, good deportment, punctuality and regular attendance should then be explained, and qualities specially required in an operator pointed out, viz., politeness, accuracy, speed, quietness, patience, cheerfulness and tact. They should also be told to make it their endeavour to instil into the minds of the subscribers a feeling of confidence that they are doing all in their power to give them a prompt and good service.

The rule books should be gone over and should from that night come into force as far as they apply to the class, as a well-disciplined class will make good operators, and good operators will give a good service.

A brief description of the telephone might now be given.

Lecture 2 should describe and explain the subscribers' instruments, unlimited, automatic box, and party line, and their various parts and uses explained; how the line from the subscriber's telephone is brought into the testroom and from there into the switchroom. The various parts of switchboard should be explained minutely, beginning at the multiple, going downward, thus: Multiple, junctions, ordinary service and record, answering jacks, calling signals, pilot lamp, cords, switches, clearing signals, order wire keys and ringing keys, howler, and generator, so that while learning the different parts the mind is also making a photograph of them, the impression given being a double one, a method which should be followed as far as possible in teaching learners to commit to memory the different parts of the apparatus. An operator's instrument should be described, how to adjust and hang it up, and at the same time the necessity for care of apparatus in their possession should be explained to the girls.

Lecture 3.—*Voice Training.*—This is most important, and should now be taken up. Each learner should be taken separately and a demonstration given over the telephone, the learner being made to repeat the phrases after the teacher until she is satisfied that the learner understands how to control the inflection of her voice, and can articulate clearly. Expressions to be used when operating should now be stated, and the rules regarding the repetition of numbers explained, attention being drawn to those which might be confused and the methods adopted to avoid such confusion.

Learners have the feeling when first speaking into a transmitter that they must speak loudly and with an effort, but this should be checked at once, and they should be told to speak quietly and distinctly, so that the voice may carry well, and to cultivate an agreeable and cheerful voice which will convey to the subscriber a feeling that the operator is on the alert and taking an interest in her work.

Lecture 4.—*Switchboard.*—Explain use of different parts, show how to handle cords, switches, order wire keys, and ringing keys; explain special marking and pegging of multiple; codes, exchange names over order wire, letter code, order wire keys, and opals; colour code for opals; multiple jacks, pegs, order wire and ringing keys; also code for party-line ringing and measured rate pads.

Lecture 5.—*Definition of Calls.*—Effective and ineffective, local and junction, junction centres. Explain different classes of calls and party-line calls, how to record, demand and check payment, how to deal with transferred, engaged, official, and miscellaneous calls. Team work explained.

Lecture 6.—*Faults.*—On switchboard, operator's instrument, subscribers' lines and instruments; how to test for them; method of dealing with and reporting them; morning test explained; complaints made by subscribers *re* engaged numbers, cut offs, delays, faults, how to report and deal with these; how to deal with calls after being asked a second time.

The next four lessons should be devoted to practical work, to which most careful supervision must be given, awkward movements or bad habits being at once checked. The examination should take place on the eleventh night, and the candidates brought back on the twelfth night to go over their papers and be told the results.

The above course of instruction may seem very limited, but with evening classes which are only twelve in number we find that more subjects cannot be dealt with and justice done to them. The number of learners should not, I think, exceed twelve per class, as this number is the limit for dealing satisfactorily with practical work at a class of two hours' duration.

On entering the switchroom these learners should not be put to busy positions, but to learners' positions with graduated numbers of subscribers, begining at ten, then twenty, 30, 40, and 50 flat rate subscribers. Between each learner a senior should be placed, and a special supervisor who thoroughly understands the school methods should supervise them until such time as they are fully qualified to take busy positions, many promising operators having been spoilt through being put to busy boards too soon. In many cases it has been found that the slower beginners, if conscientious, ultimately become the smarter operators.

It generally takes from four to six months before an operator can satisfactorily take a busy position and during that time it is very necessary that she should have special supervision as six months' good training is infinitely better than one year of bad.

Another matter in which the classes may help to improve the service is by keeping up the standard of operators, only those girls, who combine all, or nearly all, the qualities essential to good operating being passed so that a uniform and efficient service is given.

With the increasing number of new operators it is important that the service should not suffer, and this matter ought, I think, to be dealt with on somewhat similar lines to those of extensions of switchboards. If the electrical staff are preparing for new positions fully equipped, without faults, and in good working order, it surely follows that the Traffic department should be training operators to fill these positions satisfactorily. In restricting the additions and replacements to immediate requirements the service is bound to suffer, a state of matters which cannot be described as "economy with efficiency."

The operator is one of the most important factors in telephone working; however perfect the system may be, if the operator be inexperienced or indifferent, the service given will not be a good one.

HOTEL TELEPHONES.

ACCORDING to a paragraph in a New York paper, one hotel in New York City does more telephone business than is transacted by the exchanges of many towns. The 1,177,648 persons who dined at the new Hotel Astor last year, and the 220,196 guests who slept there during the same period of time, are of a class who make much use of the telephone; yet the extent of their patronage is something of a surprise to those who see the figures for the first time. There was a total of 25,000 city calls registered at the hotel for the month of April, 1906, and for the same month 2,500 suburban and long-distance calls appear upon the record. Supposing the other months to show similar totals, the aggregate number of calls of all kinds, exclusive of those coming in, would be 330,000 for the year. The total revenue from telephone use is something like £10,000 annually. The hotel does a large telephone business with itself; there are fully 5,000 interior calls a day, for practically every need or desire of a guest is communicated by telephone. Guests are talked to by telephone as much as they talk: there is an average of 1,000 incoming calls a day.

These are astounding figures, but so soon as the Company is successful in converting the hotel managers of this country to a belief in the branch exchange system there is no reason why like results should not be obtained on this side of the Atlantic. The hotel tariff which the Company is now offering is such to make it to the pecuniary interest of managers (as well as being a convenience to their guests) to adopt branch exchanges.

STREET CALL OFFICES.

BY F. ALBANY, *Contract Agent, Portsmouth.*

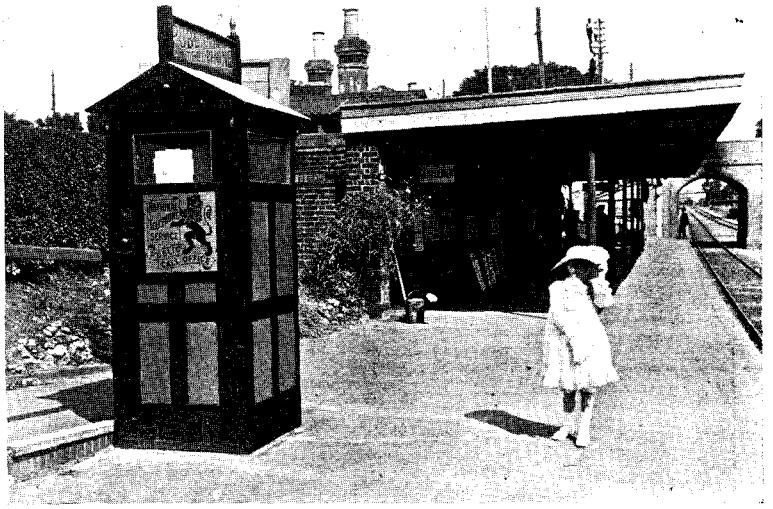
THIS important branch of the Company's business has not, I venture to think, received that amount of study and attention that it deserves. Our experience in this direction may perhaps prove interesting.

The want of a suitable street cabinet or kiosk of reasonable price, and giving a maximum of accommodation while occupying a minimum of space, is, I think, generally felt. In constructing such a call office the principal points to be borne in mind are the following:—It must be of such size that it can be installed in a position that will cause no obstruction; it must be available for day and night service; it must be as near sound-proof as possible; and last, but by no means least, a reliable method of obtaining payment for the calls must be devised. After a good deal of experimenting it has been found, after twelve months' experience, that it is possible to construct at a very reasonable figure a kiosk which is not only a splendid revenue earner, but forms in addition a capital permanent advertisement for the Company.

The entrance to the kiosk in use in Portsmouth (which was introduced by my predecessor and made by a local contractor) is controlled by a patent penny-in-the-slot automatic lock. It will be readily seen that where the payment by the public for calls is controlled by an automatic device, it is of the utmost importance that such device must be absolutely reliable; I think I may say that in this direction we can claim to have attained all but perfection, as we rarely have any trouble—in fact, the usual automatic box troubles are practically non-existent. The lock is constructed to take a penny or two halfpennies. The coins, after passing through the lock and enabling the door to be opened, drop into a detachable till which at intervals is removed and replaced by an empty one. By adopting this method of collection the cash passes through one person's hands only, as the till is not opened until it is handed to the cashier by the collector.

As an advertising medium the kiosks are proving very successful. A box is placed inside to hold any advertising matter, and a card relating to the Company's sales business is displayed. They also play an important part in educating the public to the advantages of telephone service.

The selection of a suitable site is of the utmost importance. In Portsmouth we are severely handicapped in this respect. Our friends the Corporation will not give us any facilities, and it is therefore necessary to approach private owners, but in towns where this restriction does not exist prominent sites on public property could be negotiated for.



The average revenue earned shows an excellent return on the cost of the installation, and that the kiosks are popular and supply a long-felt want is evidenced by the fact that the receipts are gradually rising.

The accompanying photograph gives an excellent idea of the outward appearance. The outside measurements are 3 feet by 3 feet, and 9 feet from the ground to finial of signboard.

PROMPT ACTION OF A GLASGOW OPERATOR IN AN EMERGENCY.

BEDFORD STREET, in the Gorbals district, Glasgow, was the scene of a somewhat rowdy disturbance on Fair Saturday. About 11 p.m., when all was quieting down for the night, the night operator was rather alarmed by the report of firearms. Going to the window she was surprised to see, even although it was raining heavily, crowds of people moving about and shouting, in a most excited manner, "He's dying," "He's dead," etc. She at once telephoned the Southern Police Office and the Ambulance, asking the former to send round a number of police, as she was sure there was something wrong.

Later in the evening a detective rang her up and related the cause of the evening's disturbance; an Italian having been attacked by a band of hooligans, in self-defence had fired a shot, resulting in the death of one of their number.

The detective thanked her very much for so promptly notifying them of what had taken place, and also for her thoughtfulness in asking them to send round a number of police, as one or two men would have been little or no use in so wild a gang.

CHANGING OF ACCUMULATOR PLATES.

By J. T. TATTERSALL, *Hull.*

Now that the introduction of accumulators is becoming general, perhaps a short description of how we dealt with the changing of some faulty plates at Hull will be of interest. The change referred to took place some time ago, but up to the present the subject has not been referred to in the JOURNAL, so if it is ancient history in this centre it may still be useful to other places who might have to deal with a similar operation.

The class of accumulator dealt with was the Chloride Company's C.R. type (eleven cells). Thirty faulty plates were renewed and the work was carried out by the Chloride people.

It was arranged to do the work at the week-end. All the stores required were sent in readiness for the Saturday. The workman reported here about 2 p.m. and commenced preliminary operations by erecting the pipes and fixing them to the water supply; this took about one hour. The men then retired and returned at 6 p.m., this being the time arranged to cut out the accumulators. A commencement was made by disconnecting the negative of the battery and coupling it direct to the negative of the machine, thus working the exchange direct from the machine. All the cells were then carefully examined and the faulty plates cut out, but owing to the proper lugs not being on the new plates, it was necessary to take them off the old plates and fix them to new ones. During the time the burner was thus engaged, two of the men emptied the first cell and thoroughly cleaned it out, then syphoned the acid out of the adjoining cell into the one already cleaned, and so on until all the eleven cells were completed. This portion of the work took about four hours. The new plates were then placed in position and made all ready for the burner, who burnt the plates together; this took until midnight. All being now ready the machine was re-connected and started with a charging current of 63 amperes, whigh was continued until midnight Sunday. Everything was then in order as shown by the following tests:—

Cells No. 1 to 11	... ...	2·05 volts each.
Total of the whole battery	...	22·6 volts.
Specific gravity ...	... ...	1215·0 each cell.

During this alteration the whole exchange was working direct from the machine very satisfactorily, and from several tests made whilst the alteration was in progress it was difficult to discern that anything was being done out of the ordinary. It should be added that the cells must not be interfered with in any way until one is absolutely certain that the contractors have got everything (material, tools, etc.) they require on the job.

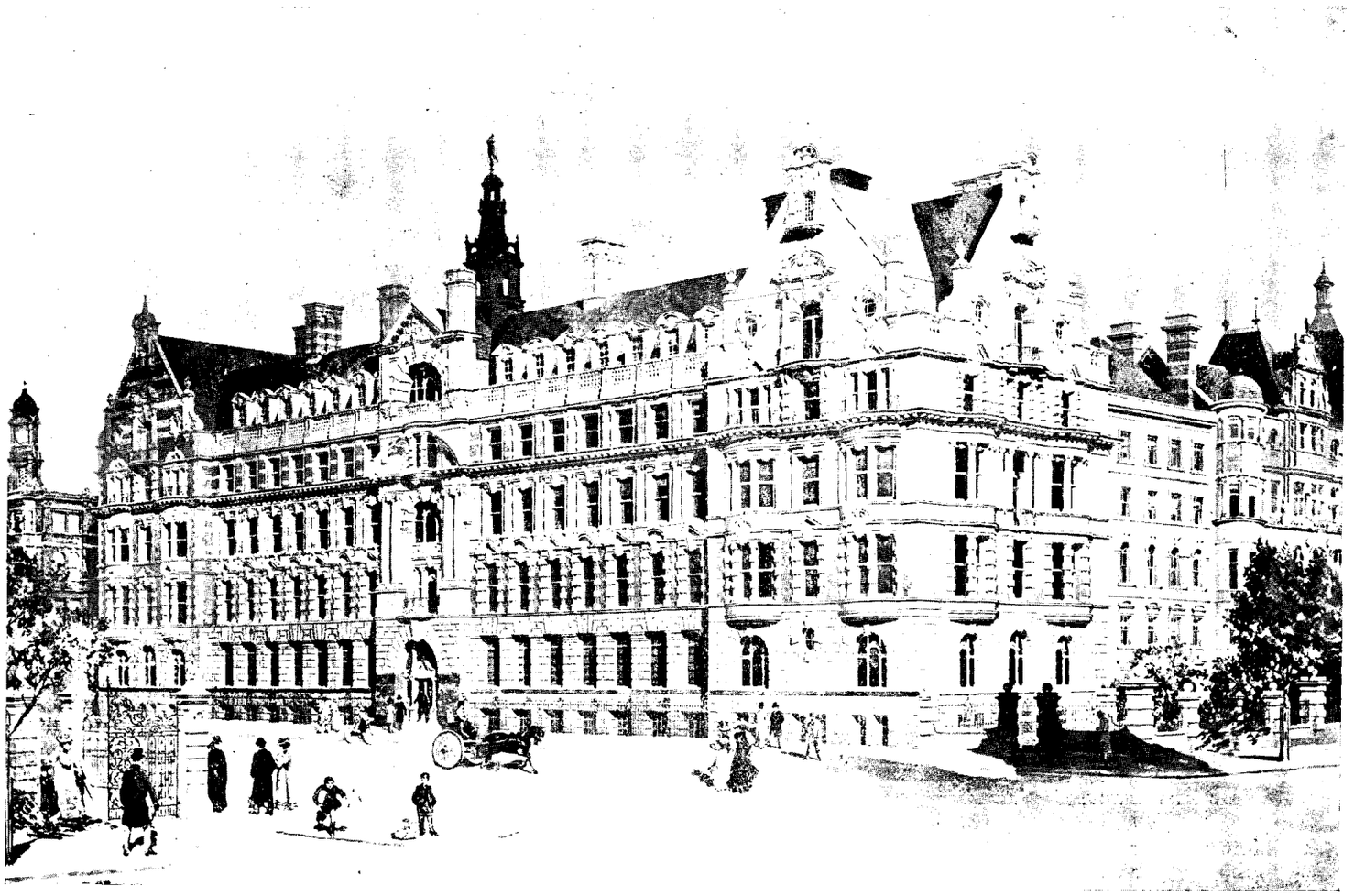


FIG. 1.—TELEPHONE HOUSE, VICTORIA EMBANKMENT, LONDON.

THE "CENTRAL ENERGY" OF THE NATIONAL TELEPHONE COMPANY.

TELEPHONE HOUSE (Fig. 1), the Head Office of the National Telephone Company, is a handsome building situated on the Victoria Embankment, London, in close proximity to the Temple, and was completed in the summer of 1900, having been under construction since the spring of 1898. Long before the *locale* of chief offices was removed from Oxford Court, Cannon Street, to the new building, the staff had far outgrown the capacity of the old premises, and sections of it had overflowed into various buildings in the City of London somewhat inconveniently separated from the main body. The Solicitors' Office was located close at hand in Cannon Street, the Stores Department in Paternoster Row, the

Southern Superintendent in Monument Street, and the Metropolitan Superintendent at St. Andrew's House, Holborn Circus. These naturally were all re-united under the same roof with the general Head Office staff at Telephone House, but on the re-organisation of the London staff and its establishment in new premises at Salisbury House, London Wall, Mr. CLAY and his assistants removed to that address.

Telephone House was built by Messrs. FOSTER & DICKSEE, of Rugby, the architect being Mr. A. N. BROMLEY, of Nottingham.

FIG. 2.—RIVER VIEW, LOOKING WEST.

It has a frontage on the Embankment of 50 feet, and in Temple Avenue of 214 feet. That its front rooms command a delightful view up and down the Thames will be seen from the accompanying photographs (Figs. 2 and 3) taken from one of the second floor windows. The river here is very busy; grain, timber, and coal barges, tugs, and County Council steamers, pass in endless procession, and even an occasional torpedo destroyer is seen. The naval volunteer training ship *Buzzard* is stationed just in front of the building.

The sub-basement is occupied by heavy stores, the coal vaults, and the heating apparatus. The basement contains the stationery stores, the packing room, a Postal Department whence the letters from the whole building are dispatched, and a printing office with four machines and a staff of eleven compositors, machinists, etc.

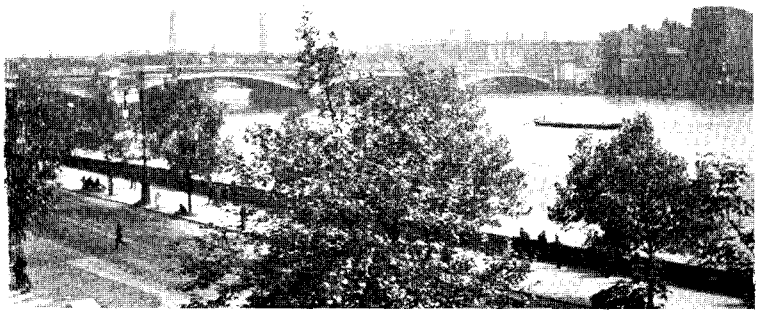


FIG. 3.—RIVER VIEW, LOOKING EAST.

The ground floor contains the Secretary's Offices, including the Accountants', Audit, and Share and Transfer Departments, and that of the Cashier. On the first floor is situate the Board-room, the Committee-rooms, the Legal Department, and Draughtsmen's Office. The second floor is allotted to the General Manager's staff, including the Stores and Stationery; and the third, to the Engineer-in-Chief and the Southern Superintendent. On fourth floor is a fully-equipped investigation laboratory containing unique apparatus for the study of telephonic phenomena; a typewriting department containing a small switchboard with lines connected to all the offices in the building, so that every senior clerk is enabled to dictate a letter to the typist at her machine without moving from his desk; and a private branch exchange for 140 lines (of which

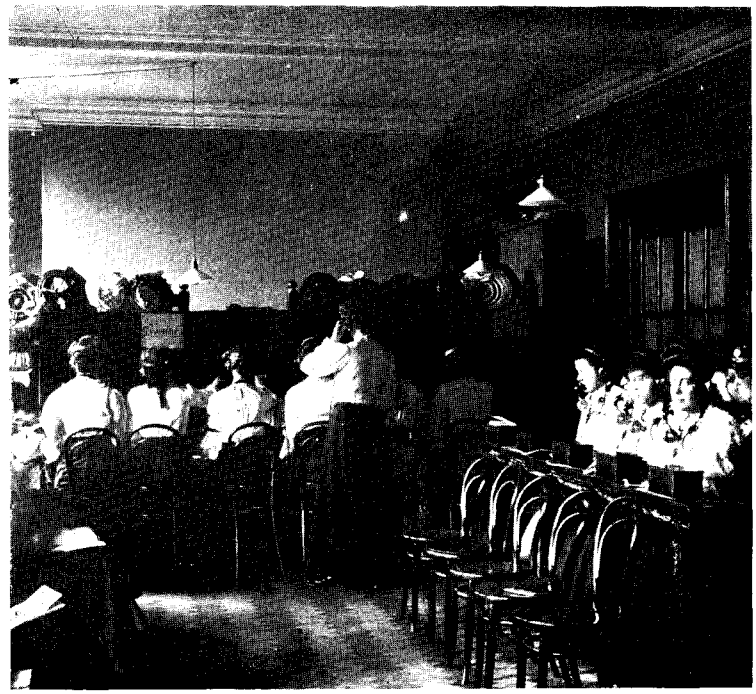


FIG. 4.—OPERATING SCHOOL

68 are working) connected to the Holborn Exchange by eighteen junctions and to London Wall by six. Lastly, there is a school for the training of operators with accommodation for some 30 to 40 girls. The learners remain a month in the school (which turns out some eight to ten operators weekly for the London service), after which they complete their training in one of the exchanges.

FIG. 5.—ENGINEERING LABORATORY.

The photograph we publish (Fig. 4) shows a portion of the school, which will shortly be removed to new premises at London Wall. Fig. 5 shows a part of the laboratory and the oscillograph, an instrument for rendering telephonic speech waves visible to the eye.

A staff of upwards of 300 is employed in the building.

THE RELATION OF THE STAFF TO THE PUBLIC.

By W. H. GUNSTON.

To the general public a limited company is something nebulous and intangible—we know it has no body to be kicked—an impalpable screen shielding a class of malefactor known as directors, a class which is supposed to connive at lateness of trains, breakdowns on the line, overcrowding of carriages, faults on telephone wires, inattention at exchanges, extortions, and turpitudes of all sorts. A company materialises for the public through its works and through its staff; and the two are almost identical, for the latter are to a large extent responsible for the former. When the public therefore encounters an inspector, a stationmaster, a district manager it communes with itself thus: "Here at least is something tangible; something kickable. . . . Now, sir, touching the matter of that scandalous delay in fixing my telephone (answering my calls, or what not)"—and makes him, in effect, the *corpus vile* for its recriminations.

The attitude of the staff of a great company to the outside world is a matter of the highest importance. This is especially the case with the National Telephone Company, whose officials of almost every grade and description come into immediate contact with the public to an extent which exists in few other organisations. Managerial, clerical, engineering, electrical, operating and labour, all have to deal with the Company's subscribers, actual and potential, and on these dealings the reputation of the Company for good or evil is to a great extent built up.

To encounter with an unsympathetic or even antagonistic tone a man who enters an office to disburden himself of a grievance is calculated neither to soothe him nor to enhance his opinion of the Company's methods. It seems almost superfluous to say that a man with a legitimate complaint should not be regarded as a nuisance to be encouraged as little as possible; but this tactless attitude, occasionally adopted by clerks of unfortunate manner, is without doubt a fruitful cause of bitterness in the complaints of subscribers and of that implacable, unreasoning attitude which certain of them ultimately come to take up. Once let a man feel that his complaints are met with indifference, that enquiry is perfunctory, and remedy quite haphazard, and he will acquire an ingrained mistrust of all explanations, however reasonable, and become one of those frequent and unsatisfiable complainants on whom painstaking investigation is almost thrown away. All men, including managers, are not equally gifted with tact. To some it is possible to beard the enraged subscriber in his den; to explain to him that his long-standing troubles are due, it may be, to no fault of the telephone as such, but to the inadequate inward facilities which he offers to his customers; to persuade him to take another instrument, a branch exchange, a trained operator, and so forth; and to turn his loud curses to tears of gratitude. It is not given to all to change a mistrust of five years' standing to a reasonable confidence that the Company is willing and able to give the subscriber a highly efficient service, but there are, no doubt, too many cases where the hardened complainant is treated as hopeless; his complaints are enquired into and an explanation sent to him, but the man remains unconvinced and inimical, where, perhaps, some intelligent consideration of the subscriber's circumstances, habit or temper, might trace the source of this continued friction to his fundamental misapprehension of the nature of a telephone service, to the defective internal arrangements of his office, or to vagaries of some easily ruffled chief clerk.

To the officers of the Contract Department the public is as a field to be tilled, or a harvest to be gathered in. They are the missioners of our creed, the pioneers of an invaluable blessing of modern civilisation. They venture into the outer darkness, and preach the telephone to those lost in barbarism. Well has it been pointed out at annual contract meetings and elsewhere that theirs is an office of pride and by no means to be confounded with those persuasive visitors who endeavour to sell us mangles or gazetteers, encyclopædias and other short cuts to fulness of mind; but rather that they are vendors of an indispensable business requisite and home convenience, and, moreover, the accredited representatives of a great trading corporation. Their relations with the outside world must of necessity be governed by an agreeable tactfulness. This point, however, has been fully dealt with elsewhere in this JOURNAL (p. 79) and need not be insisted on here.

The wayleave canvasser's task with the public is arduous and unenviable. He requires a tongue of honey and a temper of gold. Since the Company has no statutory powers, it must of necessity procure the necessary wayleaves from property owners. Insuperable objections have often to be overcome which require all a man's persuasiveness, for it must be confessed that a pole in one's back garden, or a staple on one's chimney-stack, is not without its disadvantages. The love of one's fellows, the benefit of the general community, the advancement of civilisation, are amongst the arguments addressed to the stony-hearted, and failing these the canvasser may be driven to appeal to the property owners' æsthetic side and expatiate upon the beauty of copper-bronze gleaming like golden threads in the sun, or upon the soothing hum of the wires like the music of Æolian harps in the night.

Very different is the reception of the inspector in the telephone user's office. He is as welcome as the doctor to the sick man, and the subscriber's gratitude often assumes a shape not countenanced by the rules and regulations of the Company. But it behoves him to remember that as he may leave behind him a good impression in a mind thankful for an invaluable service restored, so also he has it in his power to affect seriously the popularity of the Company by work ill-done and apparatus carelessly fitted.

Of the engineering staff the construction men come in most direct relation with the public. In their wide range of operations they open the streets for underground work, stretch wires and cables overhead, plant poles, and make attachments to all descriptions of property. In the former works life and limb may be jeopardised by any sins of omission or commission, for which the Company would be cast in heavy damages; and in the latter their presence in peoples' gardens, on their roofs, or inside their houses may result in a string of complaints and claims, or be marked by a civility and workmanlike performance of their duties which will render their enforced intrusion quite inoffensive.

When the contract has been secured, the wayleaves obtained, the wires run, and the instrument installed, the section of the staff with whom the public is most pressingly concerned is undoubtedly the operating staff. The invisible, assiduous feminine presence at the other end of the line—*vox et præterea nihil*—the personality oft-heard and never seen, then plays an all-important part in the telephone service. What should be her attitude to the public? The ground has been so fully and so well covered in other essays in this JOURNAL that I need touch upon it but lightly. Efficiency and civility being, of course, understood, I think that in addition she must acquire a habit of toleration and allowance for the subscriber's lack of knowledge of the conditions of exchange working. As the book of exchange regulations well puts it "it must be remembered that the subscriber does not know what is going on at the other end of the line." As telephone officials all over the world recognise, it is most desirable that frequently-complaining subscribers should be shown over a busy exchange. To know all is to forgive all, and where there is no occasion for forgiveness there is often much to explain. There must be at times a tendency to pay more attention to the requirements of an egotistic, over-exacting and threatening subscriber than to those of a more reasonable and patient one, and I think that the strength of mind which would enable an operator to treat the reasonable and unreasonable man with perfect impartiality is a quality of immense value and one which should be cultivated. As regards switchroom managers and clerks-in-charge, it is for them to strike the happy mean betwixt constantly bolstering up their operators' statements on the one hand and harassing them with too frequent complaints on the other. It need not be insisted on that the subscriber should have the manager's sympathetic ear and that reflections on the veracity of complainants should be avoided, the more so as many telephone users are liable to error from ignorance of the processes of switching.

The good relations of the staff and the general public are of prime importance, and it is abundantly clear that any officer of the Company who has its interests at heart should seek to further them. Whether in the office, over the wire, by correspondence, at interviews, in visits of inspectors, or at other points of contact, a cordial and sympathetic attitude must be maintained. To weaken or alienate the confidence of the public is undoubtedly as directly injurious to the Company as to cut down its wires or damage wilfully its instruments.

THE SUBSCRIBER AND THE "DOUBLE-OHS."

BOSKINS' office boy, says the *New York Press*, was away on a vacation last week, and Boskins undertook to answer the telephone. He is now firmly convinced that the ways of the telephone girls are past finding out. He had always been treated courteously by the sweet-voiced "telephone girls," but he has come to believe that they were only making game of him.

Boskins had to call No. 2,100 "John" Exchange several times in the daily course of business. The first day after the office boy had gone he took down the receiver with confidence.

"Give me twenty-one hundred 'John,'" he said.

"What is it?" asked the girl in a shocked voice.

"Twenty-one hundred," repeated Boskins with precision.

"Oh, you want two-one-naught-naught," said the girl kindly, as she gave him the number.

Boskins felt rebuked, and he remembered the correction, storing it away for future reference. "Always say each figure separately," he told himself. "Don't attempt any fancy combinations."

He was in a good humour the next time he called the number.

"Give me two-one-naught-naught," he said.

"Two-one-double naught," said the girl promptly, with the accent on the "double," as though correcting him.

The next time he called the number he decided to try the new combination.

"Two-one-double naught," he said pleasantly.

"Twenty-one-naught-naught," said the girl, and Boskins retired still more bewildered.

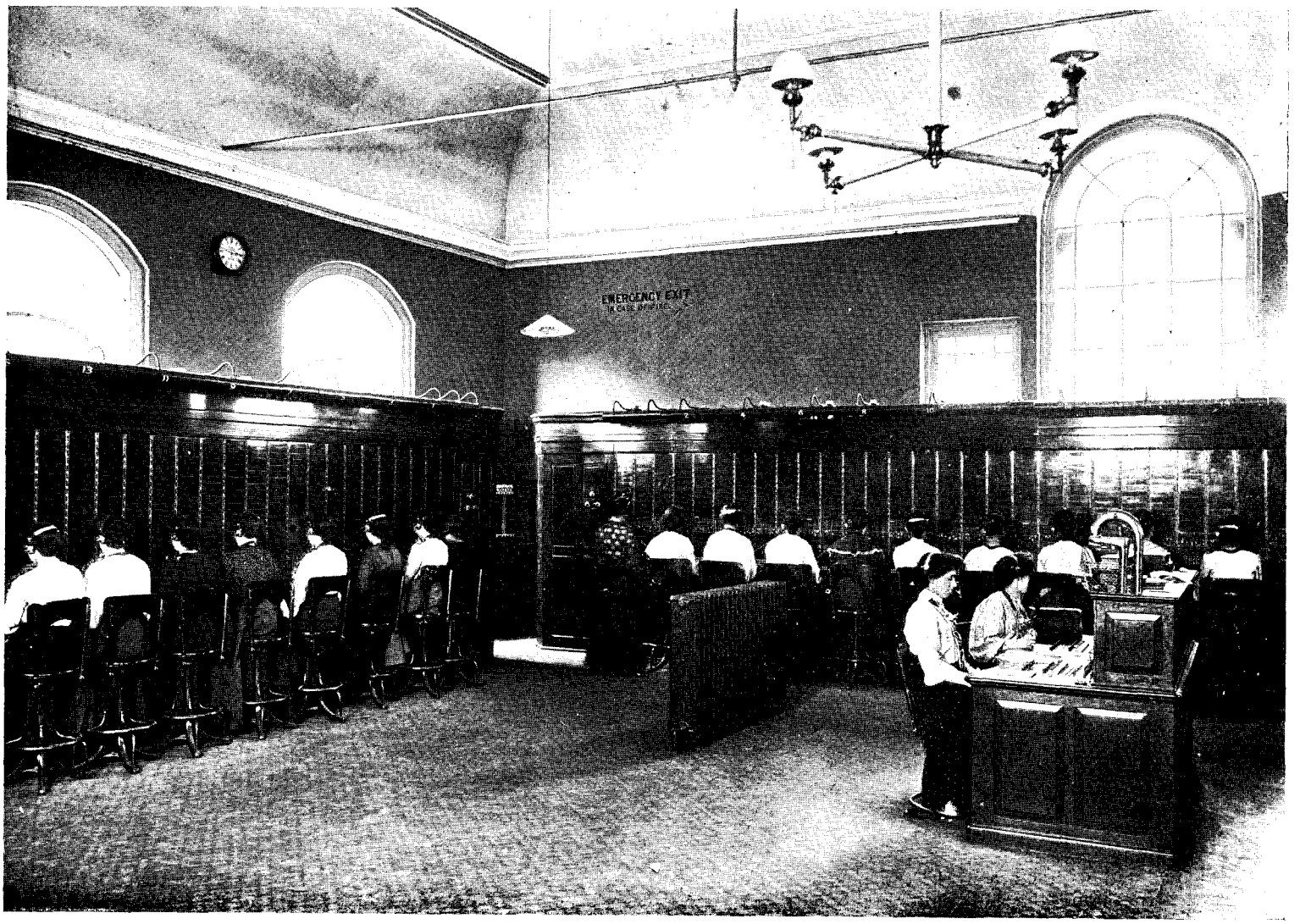
That afternoon he had to call the number again.

"Twenty-one naught-naught," he said, and held his breath.

"Twenty-one double-oh," corrected the girl as she gave him the connection.

Boskins was so confused by this time that he could hardly talk. It worried him all the afternoon. He wished the office boy had not gone away. Then, in despair, he took a pencil and figured out that the number could be given in nine different ways. They were:

Twenty-one hundred.
Twenty-one-naught-naught.
Twenty-one-double naught.
Twenty-one-oh-oh.
Twenty-one-double-oh.
Two-one-naught-naught.
Two-one-double naught.



NORTH EXCHANGE, BARNSBURY.

THE above illustration shows a corner of the North Exchange, London. It is equipped with the common battery apparatus, and has a capacity for 6,100 subscribers' lines. Its present equipment is for 3,600. It was opened on Dec. 17, 1904. It was in this room that MICHAEL FARADAY used to attend Divine Service.

Two-one-oh-oh.

Two-one-double oh.

Boskins studied them all over, and hope rose again within him. The next time he approached the telephone it was with an air of confidence.

"Twenty-one-oh-oh," he said. A smile played about his round face. He wondered how the telephone girl would receive this combination. It was the only one of the nine that she had not given him. There was a moment's silence after he had spoken the number. Boskins smiled at his own craftiness. This, indeed, was a Machiavellian triumph.

The girl asked him to repeat the number.

"Twenty-one-oh-oh," said Boskins, like one propounding a riddle.

"Oh, you want two-ten-naught," said the girl brightly. Boskins weakly hung up the receiver. He thought about it a long time, and finally decided that it was useless to stake his poor wits against those of the telephone girls.

"They might have a hundred combinations, for all I know," he grumbled.

Boskins hired an office boy the next day.

STORES AND STOREKEEPING.

By FRANK MILLER, *Storekeeper, Glasgow.*

THE telephone system, like all other systems, has been built up little by little. The building up process is still going on, and if I make one or two suggestions in this department (the stores), it is not with the idea of making a bad system good, but rather of making a good system better, which after all is the obvious duty of every employee.

Experience has taught us that there are several essentials required in the individual to qualify him for such a position as storekeeper, especially in a business like that of the National Telephone Company. One of these is watchfulness, combined with practical experience.

The storekeeper has to arrange matters so that there shall be a constant and equal circulation of supplies. If the stock of any one of the various articles falls short it may delay work, and if, on the other hand, the stock is in excess of the requirements it means overcrowded stores and dead capital, all of which means waste.

Another important quality is that of a methodical habit of mind. Of all the departments in the service none requires this more than the stores. If the storekeeper makes an error and issues or returns material without proper entries the mistake may pass unnoticed until the annual stocktaking, when there will be an excess or a deficiency.

I am afraid some people have the mistaken idea that any ordinary individual is quite capable of taking up the position of storekeeper or storeman. Those who recognise the importance of storekeeping will fully appreciate how wrong this idea is, and, even to one not acquainted with store work, the importance of good storekeeping will be seen, when I mention that in the Glasgow stores—of which there are three, one for heavy line, one for cable, and the chief store for both inside and outside material—the storekeeper receives, roughly, 280,000 requests per annum for stores, and the total cash value of the year's transactions is something like £140,000.

The extent of this business shows the necessity for another quality in a storekeeper, that of carefulness, not only on his own part, but on that of his assistants. Then there should always be an eye to economy; the interests of his employers ought to be his paramount care, and he should see that there is no waste. Everything has a certain value attached to it, and that value should be realised to its full extent. In practice this means working to the old proverb which inculcates having "a place for everything and everything in its place"—the foundation of all organisation.

Up till a short time ago, line stores were delivered over the counter to the foremen on the production of the usual requisition slip. We are now experimenting with vans, by means of which the material is delivered direct to the foreman at the place where he is working, thereby saving that part of his own and his men's time formerly taken up in coming to the stores. In arranging for the sending of supplies per van much depends on the method adopted, so that the most can be got out of the hire without keeping the gangs waiting. Every assistant must have his part to do and must make himself a specialist at it, even if it be in a small way. By this means the difficult is made easy and the uncertain sure.

The delivery of the material does not, however, lessen the responsibility of the storekeeper, as all line stores are requisitioned for on Form B. 96.

Regarding these slips, I am sure my *confrères* will agree that they have disadvantages, one being the want of space and the consequent cramping of writing. It must be remembered that while the slip may present no difficulties to one with a clerical training, yet it is otherwise with the average foreman, who can hardly be expected to do his writing very neatly, considering the circumstances under which he has often to make out the slips.

His requests may be chosen from a list of approximately 2,000 articles from a 1-in. screw to an 80-ft. wooden pole, and not at all times are the demands clearly stated. For example, "twenty ⅜-in. corkscrews" is more suggestive of a picnic than of telephone work; substitute "coach" for "cork," however, and it looks more business-like.

It is at once seen there is room for mistake if the storekeeper or his assistants lose their heads or trust to memory instead of making each transaction complete before beginning another.

Accuracy in the slips mentioned means an ultimate saving in time and money, for whilst the stores clerk is responsible for the bookkeeping, he is necessarily dependent for his information on the various slips sent him from the stores, and if these are in any way incorrect it is obvious that there is waste of time in making enquiries.

While dealing with slips, I would suggest the advisability of a day book being kept, not in any way to interfere with Credit Book B. 37. This book is not always available when required and then the individual receiving the material from the carrier has to trust to memory (always a bad method). The credit book also is not arranged for many details that are required, viz., name of carrier, description of packages, carrier's weight, Company's weight, changes and remarks. A book of this description is used in Glasgow store, and has proved valuable for reference.

THE BUSINESS LETTER.

By R. A. WATSON, *Bolton District.*

WHILE the suggestions contained in the article "Team Working in Offices" are excellent, it would probably be found on enquiry that the system advocated has been loyally carried out in many district offices—certainly it has in Bolton where it has been practised for several years. Mr. LYNN'S article, however, omits mention of what appears to me to be of equal individual educational advantage, viz., the ability to write or dictate a business letter. I wonder how many of the staff could go to the typist and dictate a sensible business letter of any length; or, from specimens frequently seen, how many typists could pass an examination in punctuation, or get full marks for the general "get-up" of a letter?

It is not for everyone to be a polished writer, nor is this necessary, but the ability to "write right when you write" may certainly be obtained by assiduous practice. There are several excellent textbooks on the subject issued at very reasonable prices.

I do not think it is generally realised that the business letter is really an advertisement—good or bad—according to the manner in which it is written. It should not be "smart," it should never be written indifferently, nor incorrectly, but simply represent the sender in style and quality, telling its story to the best ability of the writer. The importance of sending out sensible, well-dressed letters is easily seen when we realise that the direct relations between the Company and probably quite 70 per cent. of its subscribers are limited to the appearance of an inspector and to the correspondence. The letter is an essential part of business, and its value cannot be

over-estimated. Especially is this the case in a letter setting out tariffs, sales, quotations, etc., as it is to be presumed that the writer is more interested in the contents of the letter than the receiver, and every endeavour should be made to make the work of understanding it easier for the reader. Every letter carries with it an unwritten request that it be read, and the better it is written and the easier it is made for the receiver to grasp its contents, the more likely is he to be impressed.

The written word is recorded for ever, and the receiver, who may be miles away and is usually a stranger, must judge you and your business by what you write. If an ungrammatical, ill-spelt, or badly punctuated letter reaches an intelligent reader we can hardly expect him to think well either of the Company which permits such epistles to be sent, or of the service which it has to sell. In the words of the old saying: "First impressions last longest."

Of great advantage to the would-be letter-writter is the study of synonyms. A command of these enables one to write terse sentences, clear and euphonious, and makes it easy to avoid the constant repetition of time-worn phrases. In fact one can hardly study synonym work too much. It is the secret of the success of that class of people of whom it is said "writing comes easy."

The study of letter writing will bring its own reward, as there is nothing in this "world of words" that meets with such hearty approval as the practical knowledge of expression; and it is a natural sequence that a man able to compose a creditable letter should also be able to hold his own in argument and conversation with anyone in the business or social world with whom he comes in contact.

DISTRICT OFFICE FILING.

By A. Garner, *Chief Clerk, Reading.*

An important branch of the work in our district offices is that of filing. Good order with our papers is very desirable. Nothing looks worse than to see an untidy desk, and few things are more annoying than being unable to find a specific paper at the particular moment it is called for, apart from the waste of time and money involved.

In order to overcome these difficulties the following arrangements were made in the Reading district office some few years ago and are still adhered to. The system enables *anyone* to find what is required, whether he be the person dealing with the matter or not.

In the first place we have several rows of shelves on one side of the district office sufficiently far apart to take comfortably an Amberg filing case. These cases are used in conjunction with Shannon filing clips and perforator. On the portion of the case in view is stencilled briefly the description of the contents. As soon as the papers are handed out to the various clerks they are immediately perforated and placed on their respective clips, the idea being to deal with the forms *from the file* as far as possible, instead of, as is believed to be the usual practice, to deal with the forms first and then to file. The method works as follows:—

Completed Works Orders on receipt are at once placed on the clips in consecutive order, and after the account has been rendered and the usual particulars entered in Rental Register, 3, 3*a*, 2*a*, or 2*b* Return, etc., as the case may be, they are transferred to another file in consecutive order, to await the close of the month, when the cost slips are attached. After being checked and initialled ready for audit the Works Orders are placed in other Amberg cases, stencilled "1," "101," "201," "301," etc. (an Amberg case will take 100 Works Orders nicely), no clip being used as it is found more convenient to have the Works Orders loose, although they are in strict numerical order. After audit, the Works Orders are taken out of the cases and filed permanently on wire or string. The cases and clips being used over again will last for many years, and any stencilling on the cases can be easily sponged off.

Stores Requisitions.—A separate case and clip are kept for each foreman, inspector, etc. The books of requisitions all being numbered the same, 1 to 100 inclusive, it was sometimes found difficult to differentiate; to meet this we have given each person a permanent number by which his requisitions are known, the men numbering each requisition with their own numbers right through the books as soon as a new book is issued. The book number only is stencilled on the cases. The requisitions being filed immediately they are received it is quite easy to tell whether any are missing; should there be any the matter is investigated there and then.

Invoices for Stores and Stores Debit Notes are placed on the same file until after receipt of stores credit slip, when they are filed separately. At the end of the month the 6*a* Return is prepared from the completed invoices. The first file enables us to tell what credit slips are expected, and if they are not to hand in due course the matter is at once taken up at the right place.

Message Rate Forms.—Separate case and clip are kept for each exchange. Should there be any forms not to hand on date due the necessary steps are taken to ensure their being forwarded. It is found out automatically what forms are missing by placing those which are received on the clips.

Party Line Forms.—Similar procedure as for Message Rate Forms.

Call Office Sheets.—Separate case and clip are kept for each call office. The trunk fee accounts are placed in these cases by the fee clerks in readiness for a check to be made between the accounts and the sheets.

Accounts Requiring Payment.—We have a case and clip for amounts under £2 and one for amounts over £2, the accounts from the latter file being extracted on the usual "requisition for cheque" days.

Agreements.—After issue of Works Orders, contracts are put in their own file and are taken therefrom for the purpose of stamping at the Inland Revenue Office, care being taken to place this case in the safe over night.

We have also separate cases for the following:—Debit and Credit Slips (each series), Telegram Sheets (each exchange), Trunk Tickets (each area), Debit and Credit Notes, No. 1 Return, Junction Fee Tickets, Junction Fee Summaries, 17 Forms, Receipts, (from which the No. 5 Return is prepared weekly), Petty Cash Returns (from centres and sub-centres), Duplicate Stores, Invoices, etc.

I have not touched upon the question of filing correspondence, as the subject is a wide one, but I hope to deal with it fully in a later paper.

THE TELEPHONE IN WAR.

One of the beings whom the Japanese army system has abolished is the orderly officer. We all know, says Mr. T. P. O'Connor in *T.P.'s Weekly*, what part he has played in the war, and still more in the romance of war in the past; how the gallant fellow rushed off through a shower of bullets to carry the orders of his chief from one part of the battlefield to the other, and how often he fell long before he could carry his message to its destination. Look on the picturesque figure with interest additional now, for he disappears for ever from the scene. The telephone has taken his place. There are few passages in this book (*Port Arthur: The Siege and Capitulation*, by Ellis Ashmead-Bartlett) which have struck me with more wonder than those which describe the function which the telephone has played in the war work of these singular Eastern people, who have not merely caught up with the largest advance in the scientific warfare of Europe, but have far outstripped it. Here, for instance, is the manner in which the artillery work of the Japanese was directed before Port Arthur; there is something at once inspiriting, weird, and fascinating in the description:

"All the guns before Port Arthur were divided up among the various divisions; and the guns, scattered over the ground covered by a particular division, were under the direct command of the artillery commander of that division. The artillery commander of each section was represented in the observation station of the Chief of Artillery by an orderly seated in front of one of the telephones. The artillery commanders thus received their orders direct from the Chief of Artillery, and it was their duty to transmit his orders to the various batteries under their command. Much latitude was allowed the battery commanders, so that, if some favourable mark presented itself, time was not lost in telephoning through to ask

permission to fire; the firing was done first and an explanation sent afterwards. It was only during the great assaults, when it became necessary at times to concentrate the fire of many guns on some particular point, that the advantage of this elaborate system of communication between the Chief of Artillery and the batteries was manifested.

"The observation station of the Chief of Artillery was connected by telephone to various points in the front line, so that he could be informed immediately of what was occurring, and direct the fire of his batteries accordingly. When an assault on some position was taking place it was of the utmost importance that the Chief of Artillery should be kept continually informed of the progress of the attack, and the accuracy of the fire of his guns. In order to keep up this communication the following method was adopted by the Japanese:—Each regiment possessed a certain number of trained telephonists—for the Japanese infantryman is part infantryman, part engineer, and understands many other special subjects as well. The regimental telephonists followed immediately in the rear of the firing line, and laid the telephone wire over the least exposed and most advantageous ground. When a point had been reached where no farther progress could be made with the main wire, a stake was stuck in the ground, to which it was attached. The ten or twenty men who had laid the wire carried each an instrument and two or three hundred yards of slack wire on his person, and this was attached to the main wire at the stakehead. The men then spread out in the firing line, and it was the duty of each man to take as much care as possible of his life, but at the same time to do his best to see what was happening around him. Each man on the firing line was in the same circuit as his comrades, and thus each could hear what the other was saying. It was possible to pass messages along the front of the firing line in this manner; but the primary object of the telephonists during the operations before Port Arthur was to keep the Chief of Artillery informed of the effect of the shell fire and the position of affairs in the front line. Thus, strange though it may seem, the Chief of Artillery, on a hill miles in rear of the fighting line, could carry on a conversation with men who were often killed while in the middle of a sentence. If one of the telephonists heard a comrade suddenly cease to speak while transmitting a message, he would at once know that he had been killed, and it would then become his duty to pass on the remainder of the sentence to the best of his ability. In many of the attacks the majority of the telephone orderlies would be killed, but one or two were almost certain to survive to carry on the grim tale along the wire. Thus spread out, like the feelers of an octopus, among the soldiers of the firing line, the telephone collected scattered scraps of information from all points, and communicated the news, good or bad, to the Chief of Artillery sitting in his observation station miles away in the rear."

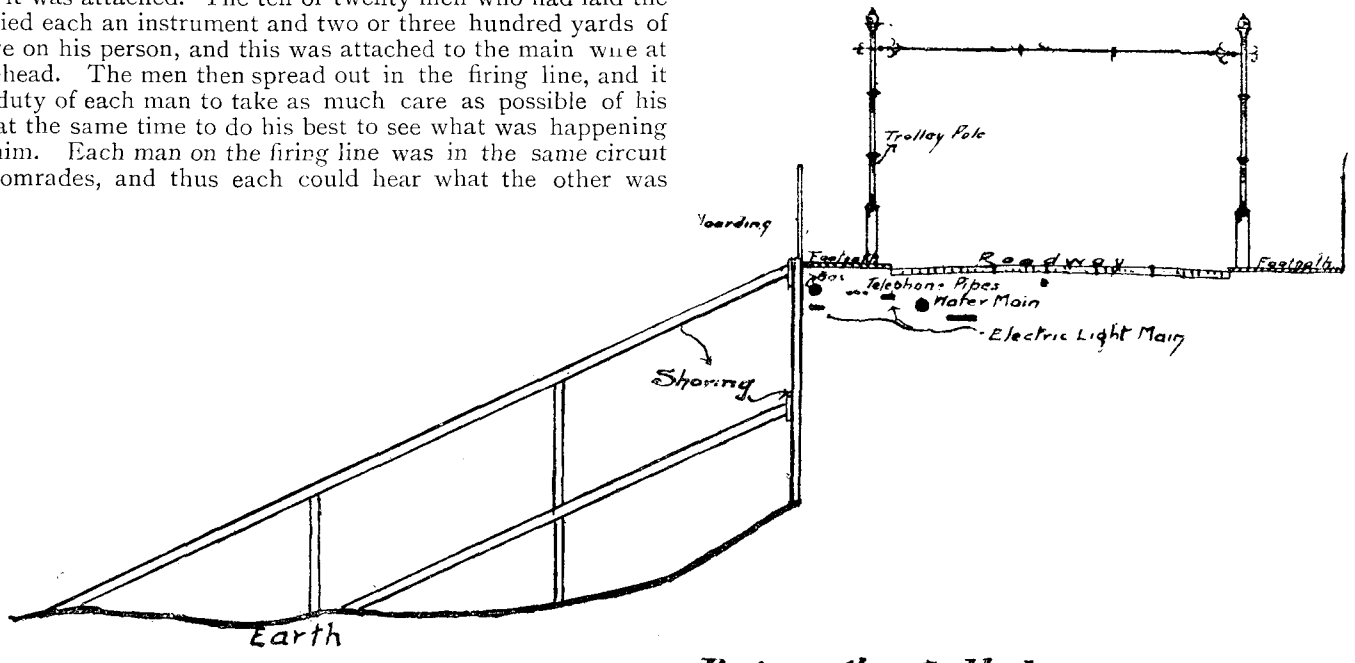
A LANDSLIP AT MANCHESTER.

BY ALFRED MAGNALL, *Manchester.*

As telephone men, there is little doubt, we shall be perfectly safe when underground and not likely to further trouble an unsympathetic public by the erection of what they are prone to regard as unsightly poles. Not always so, however, the underground wires, as was clearly illustrated during the early hours of Saturday, July 21, 1906, in a collapse of the roadway at Manchester.

Fig. 1 shows approximately the position of affairs under normal conditions, that is, the telephone pipes, water pipes, gas pipes, electric power, etc., as laid in the street, and the excavations which were being carried out on the site adjoining the street.

Fig. 2 shows the position of affairs immediately after the landslip, the gas, water and telephone pipes and electric light mains broken, and the overthrown trolley pole, one end of which was in contact with the live trolley wire and the other in contact with one of the telephone cables into which it was burning a hole. It is interesting to note that although the paper insulation was burned off 20 pairs of wires the fuses were not blown on the strips in the exchange. Although the cast-iron pipes were smashed in numerous pieces and the lead covering of the cables broken in several places the copper conductors remained unbroken.



— Before the Collapse —

— Section thro' Shoring & Roadway

FIG 1.

What happened when the land gave way can be better imagined than described, but when it is realised that there were flames at each side of the breach from the full force of a 6-in. gas main, a fountain of water from a broken water main with a pressure of about 100 lbs. per square inch, together with burning electric light cables and the arcs from the 500-volts trolley wire flying about in various directions, it will be seen that there was no lack of concentrated variety.

The cause of this landslip is not for me to theorise upon, and my remarks are therefore confined to the effect exerted upon our underground plant. As might be expected, the staffs in connection with all departments interested were promptly called out, and

I was, of course, one of the unfortunates whose peaceful slumbers were disturbed.

Having satisfied myself with the fact that the wires in the cables were not broken, and as it was a fine morning and there was no danger of damage by rain at the fractured parts, I had ample time to decide what course to adopt, which briefly was as follows :—

(1) To wait until all men arrived on duty at the usual time, 7 a.m.

(2) To send one gang (not three men and a boy) to remove the tons of earth about the pipes and cables.

(3) To set jointers and plumbers to break off all pipes from cables, and repair damaged wires and lead covering of cables.

(4) To obtain a 75-ft. pole to lay across gap to suspend cables.

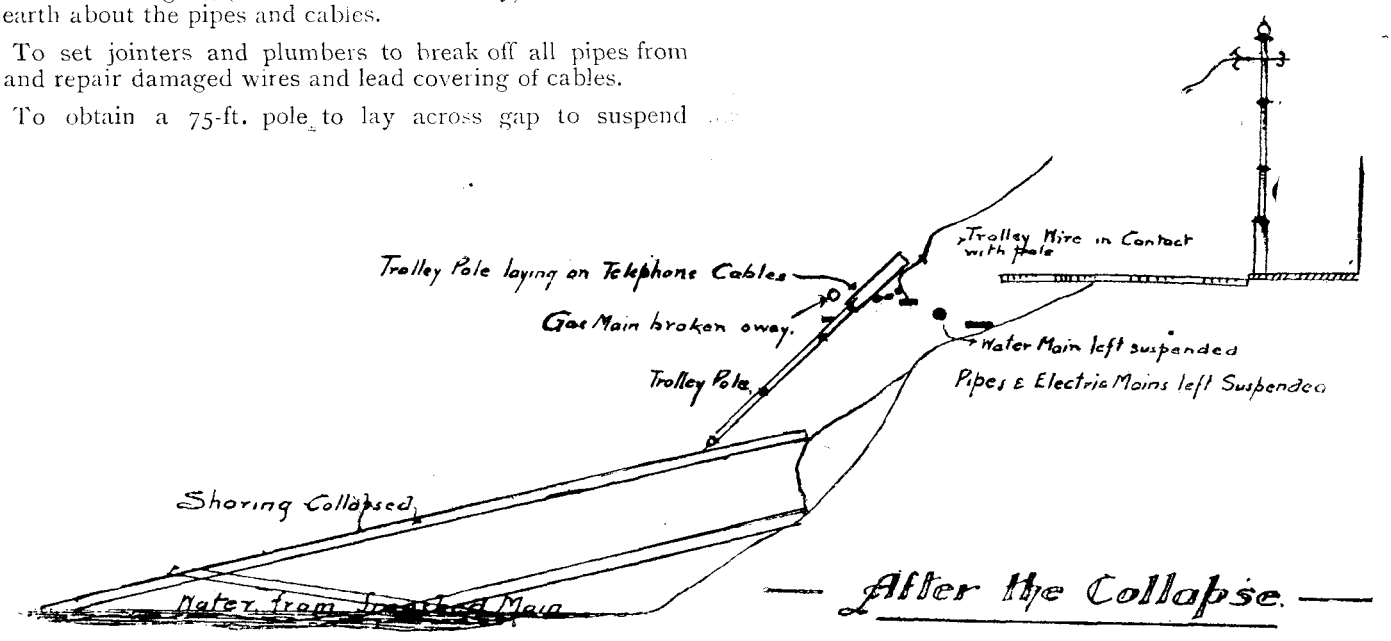


Fig. 2.

The above arrangements were carried out, the pole was in position, and the cables repaired and slung before 9 a.m. Fig. 3 shows the scene generally with pole and cables in position after repair. To save the cost of cutting and replacing these cables,

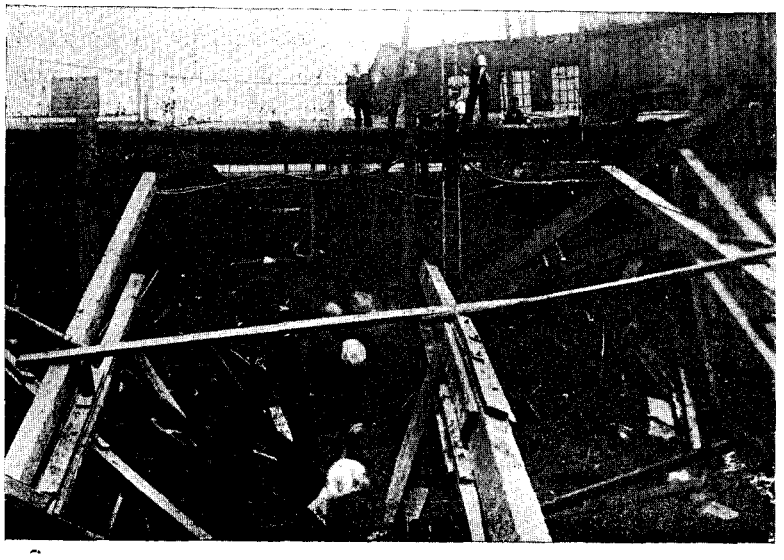


Fig. 3.

they will be protected with cast-iron troughing similar to that used by the electric light people.

Should any reader be interested in these operations and desire any further explanation of any of the points raised, I shall be pleased to give it either through the medium of the Journal or direct.

METHOD OF LABELLING CABLES TERMINATING IN TESTROOMS.

By G. F. Greenham.

The best method of labelling cables is a matter worthy of careful study. The almost universal method on magneto exchanges is to give the cable some more or less descriptive code, selected with the idea of indicating the position of the opening-out point, and usually taking the form of the initial, or initial and final letters, of the name of the street or building in which the distributing point is situated. For example, "H.S. cable," Heddon Street cable, or "S.A. cable" for the cable opening out on the Salvation Army offices.

It is obviously out of the question to arrange the cables in alphabetical order on a test frame, and in a testroom having, say, anything from 200 to 500 cables it is a difficult matter to find any particular cable without reference to a chart. With the introduction of the main frame in common battery equipments the question of the best method of marking the cables on the frame arose, and in one case it was decided to number the pairs of connecting tabs from one upwards, counting from the bottom left hand of the frame and following on from one shelf to the next. Every pair of tabs had a certain frame number, and the cables terminating in the testroom were labelled at the distributing pole to correspond, so that the engineer and electrician recognised each loop by a number only. This method of numbering is very good if the frame is never to be extended, and if cables running to other testrooms could be labelled to suit the favoured one, but it fails badly in practice, because directly the frame is extended the order of numbering is upset.

The next step was to give each horizontal row or shelf of tabs a code letter, and to number the tabs consecutively from one upwards in each row. This system allows of indefinite extension without throwing the numbering out, and in existing districts where the expense of relabelling all the cables on the distributing poles would be too great, the old cable code is marked on the frame by a block fixed on the top edge of the shelf above the initial tabs. By this means each cable lead has two numbers, viz., the cable number and the frame number. The frame number is most useful for cross-connecting purposes, and the inspector is directed by the number to the correct position on the frame, without having to hunt up and down the frame—no small matter in large testrooms for the cable code, or without referring to a chart for the lead. This system in conjunction with a simple system of cable codes is in use at the London Hop Exchange and works very well. It is an easy step from this method to the ideal method, which does away with the second set of numbers by having the leads numbered at the distributing pole to correspond with the frame numbers.

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THE STANDARDISATION OF METHODS AND APPLIANCES IN TELEPHONY.

UNDER the above title Mr. FRANK R. MCBERTY, well known as an active inventor and designer of telephone appliances, contributes a paper to the Chicago section of the American Institute of Electrical Engineers. This paper contains many useful reflections and suggestions, although it reaches no very definite conclusions as to the extent to which standardisation in telephony may be profitably adopted -rather hinting, indeed, that conditions in different places vary so widely, and that telephony generally is in such an early stage of development as to make general standardisation unwise, if not unattainable.

The function of the engineer, Mr. MCBERTY argues, is to determine an adjustment between the quality of the plant and the cost of performance. To build a cheap machine that will not work is easy; to build a costly one that will work well is not difficult; to build a cheap one that will work well is the problem. The engineer, then, must provide a standard of performance, or a variety of standards to meet a variety of conditions. In telephony the standards must cover transmission and promptness and accuracy of switching, since these are the particulars on which the quality of the product of the machine depends. The paper then goes on to point out that although a standard of transmission was established early in the history of the telephone industry in America, it was fixed too high, and resulted in excessive cost of construction. The standard was arrived at with regard to long-distance working, whereas in most places the amount of long-distance traffic was not large enough to warrant the general adoption of such a high standard of transmission. Subsequent study and experience have shown that varying standards of transmission may be applied to different localities, in accordance with local conditions. Local conditions of course vary widely, and the percentage of suburban and long-distance traffic varies in different places. In general the cross-section of the conductor is the controlling consideration in determining the economical grade of transmission. Increased cross-section improves transmission, but it increases cost of conductor, insulation, supports and duct space in much greater proportion. For these reasons, says Mr. MCBERTY, the engineer should determine for each locality, in view of the electrical losses which will be encountered in varying proportions of the probable connections, the minimum grade of transmission permissible in view of the cost of conductors.

To take examples: A town exchange remote from a city probably will be the centre of a network of toll lines extending for some distance into the country. Only a small percentage of the local calls will enter the toll lines, and an extremely small percentage of those will reach such a distance as to tax the transmitting efficiency of the local system. Such a case would seem to call for a sacrifice of quality of transmission to a considerable extent in favour of economy of construction. In the case of a large city, a considerable percentage of the conversations will be over long and profitable toll connections, while a great proportion will be through long cables. In such a case, manifestly a different standard of transmission must be established, dependent upon totally different relations between necessary grade of service and cost of giving it.

Mr. MCBERTY then deals briefly with standards of work at the switchboard and says that only recently has a definite effort been made to establish standards of performance in switching connections. Data are now available, showing the relations between cost of operating and various degrees of promptness in answering calls, and various degrees of accuracy in establishing connections. Improved service in these particulars involves increased expense in switchboards, central office space, operators' wages and junction equipment. The cost of the three factors last named should weigh heavily in establishing the grade of service to be maintained in a given locality. Unfortunately, the determination is complicated by the fact that in those places where cost of real estate, junction equipment and wages are highest, the demands for service of high grade are most imperative, but nevertheless, an adjustment should be reached in each case between the cost and the quality of the switching service. The engineer fails to exercise his function when he accepts unreservedly standards of performance which are established under unknown conditions in other places.

The paper then goes on to discuss standardisation of telephonic appliances, pointing out that the tendency is to reduce telephone apparatus to a few types of uniform application. The advantages of such standardisation are reduced cost of manufacture, reduced quantity of stocks, increased promptness of manufacture and universal knowledge of methods of use and methods of maintenance. There are certain disadvantages, referred to later, but Mr. MCBERTY, in the two paragraphs that follow, uses rather strong arguments in favour of the standardisation of appliances, which later on he finds to be not an unmixed blessing.

"The advantages arising from familiarity with telephonic appliances appear both in relation to the public users and to the

operating forces of the Company. The public is strikingly incompetent in the operation of mechanism. Mere unfamiliarity with the telephone greatly retarded the spread of its use; the same cause operates against it with respect to any change, even a trifling one, which affects the mode of using it. The addition of a button to push during ringing, the substitution of an automatic for a magneto call, the requirement that a subscriber give his order twice instead of once, or give his order in a particular sequence, involve long and patient education; the education of all users is never accomplished, and the system labours under a continual burden of inaccuracy and frequent neglect to employ it when it would be successfully used if it were familiar. We have no measure of the benefits in increased business and accuracy of service which would arise from uniform apparatus, but no doubts exist that substantial departures from uniformity are seriously harmful. It is to be noted that this consideration affects mainly outward appearances and modes of handling appliances, not their details of structure.

"The efficiency of the operating companies' employees is largely dependent upon their familiarity with the structures. I refer not so much to the operators as to the construction, inspection, and maintenance forces. The existence in a single exchange of a variety of appliances for the same general purposes very greatly increases the burden of educating these forces for their work; and during the process which is never completed, faults in the structure are continually produced or permitted because of unfamiliarity with the less common appliances. It is a familiar fact that a lack of uniformity in the sections of the multiple board, by hampering the shifting about of the operators, may seriously impair the efficiency of the force. In constructing or maintaining the plant, mere differences in the arrangement of terminals and colours of wire insulations result in defects in performance which are costly to locate and eliminate. So simple a deviation from common practice as requiring that the telephones be poled in the circuit has resulted in serious deficiencies of transmission in a large number of instruments. In ordinary mechanism lack of interchangeability of parts results in the obvious failure of the parts to fit in place. In the telephone industry the misfits usually are not apparent, they are left to work their insidious evils unobserved."

In dealing with the other side of the question Mr. McBerty is somewhat more vague than in reciting the advantages of standardisation, but he says that the disadvantages of standardising appliances are more general in their nature than the advantages. The most important is that standardising prevents the natural selections which operate where a variety of forms are present to bring the fittest to the fore. It might be argued by the advocate of standardisation that the present degree of standardisation is the result of that very selection of the fittest from among a number of different types. The paper goes on to give some examples of lack of judgment and lack of foresight on the part of those who planned telephone plants without provision for expansion, who refused to adopt party lines and opposed the introduction of the common battery system, now accepted as the "obvious and only rational construction." These examples, however, do not seem to us to illustrate the disadvantages of standardisation; they are rather instances of the persistence for a time of inferior ideas which eventually give way in the light of the experience of the majority. Mr. McBerty is on sounder ground when he states that a disadvantage of standardising appliances appears in the inertia of ideas and of plant which results from limiting the types of appliances. The public, familiar with the use of only one form of instrument, may decline to use a different though better one; construction and maintenance forces familiar with one form will oppose, malign, or even destroy strange appliances. It is a truism in telephony that the opinion of an operator cannot be accepted as to the deficiencies of familiar apparatus or the advantages of new apparatus. This sort of conservatism can be overcome by education, however; the most serious inertia, thinks Mr. McBerty, is that of the capitalist. Even when saving in annual charges can be shown in favour of improved appliances there is often no haste to make a change.

The two concluding paragraphs of Mr. McBerty's interesting paper contain very pertinent suggestions and we quote them in full.

"While it is desirable that telephone systems in their present condition of partial development should be left reasonably free to improvement, the engineer should be on his guard against waiting for new developments. The structure produced to-day will develop faults to-morrow of a sort peculiar to itself. Existing and tried structures, perhaps with some trifling improvements, the effects of which are certain, should ordinarily be preferred to promising new ones.

"One point remains to speak of, which is an important and not always tolerable factor affecting the uniformity of method and appliances in the telephone industry. This is personal interest. On the part of the manufacturer it appears in reluctance to modify his product, or to abandon an obsolete type. On the part of the engineer it often appears in his adherence to appliances of his own design. The inventor is notoriously a poor judge of his inventions. It is nearly always possible to make an appliance different and in the absence of adequate data to advance claims of improvement. The best example of telephone engineering practice in existence, which is also an example of the closest adherence to standard methods and appliances, has been achieved almost wholly without invention on the part of the engineers who created the system. Their work has been confined to inspiring others to invent, and selecting the most desirable from the product."

INTERVIEWS AND LETTERS.

The two articles by Messrs. W. H. Gunston and R. A. Watson, bearing on the relations of the staff with the public, we cordially recommend to the sympathetic attention of all our readers. In almost every interview and in almost every letter there lies the opportunity to make a friend or an enemy for the Company. It is very easy to make enemies and it is rather more difficult to make friends. As Mr. Gunston points out, one great obstacle in the way of friendly relations with the public is the prejudice displayed by the public against all great public service corporations. The average member of the public is prepared, by scant knowledge of the difficulties which beset a great and complicated business and by the stream of superficial criticism in which the less responsible section of

the Press steadily indulges, to distrust any explanation which a company official may give. If the explanation is not intelligent and convincing that distrust is deepened, and if the explanation lacks courtesy in form and expression as well as intelligence in substance and conviction in its bearing on the subject at issue, then mere suspicion and distrust are at once turned into contempt and dislike. Therefore, in dealing with the public first, be always polite and willing, and so endeavour to counteract the prejudice with which the other side starts. Next, take an intelligent interest in the subject of the interview and try to get to the bottom of it; in that way only will the member of the public be satisfied that justice is being done to him, and in that way only is it practicable to supply the convincing explanation requisite to maintain the most friendly relations.

If the scamped and artificial interview, agreeable neither in form nor in substance and unsatisfying in result, creates a bad impression and tends to make an enemy, so does the scamped and superficial letter. Mr. R. A. WATSON rightly points out that to a large extent the relations of the Company with its customers are conducted by correspondence, and that the customers will mould their opinion of the efficiency of the Company largely by the form and substance of that correspondence. A badly written and badly expressed letter creates in many minds an unfavourable impression perhaps altogether out of proportion to the importance of the subject dealt with; while a letter which purports to explain the cause of some grievance, but through vagueness or loose expression really fails to explain, is much more exasperating than no explanation at all. The cultivation of clear and straightforward expression, and of neatness and workmanlike execution of correspondence, should be aimed at in all offices. The actual execution of the letter and its envelope is not the least important part; many letters go daily through the Post Office which are an offence to the eye and give an impression of slackness and inefficiency at first glance.

On one point as to style of letter writing we are not altogether in agreement with Mr. WATSON. He lays great stress on the study of synonyms. One of the greatest masters of style, MACAULAY, said just the contrary. His advice was that you should never hesitate to repeat a word if it expressed your meaning. Nothing is gained by calling a letter in one line a letter, in the next an "epistle," and a little further on a "screed." Enlarge your vocabulary by all means and avoid "time-worn phrases," especially when they are mere meaningless forms of expression. But let your letter say what it means as clearly, definitely, and briefly as possible. If to say exactly what you mean you need to use the same word five times in five lines it is much safer to use it, even better style, than to cudgel your brains for a synonym that may be a shade or two off the proper meaning.

TELEPHONE SOCIETIES.

OCTOBER is the month when the telephone societies again begin their meetings, and whilst it will be of interest to the members of existing societies, the following information has been compiled chiefly for the information of those places where no societies have yet been formed.

Societies are now registered as existing at ten places, and the following table gives some interesting particulars, specially furnished to the JOURNAL by the hon. secretaries, relative to the status of these societies:—

	No. of Members.	Entrance Fee.	Annual Subs.	Is there a Library?	Are Technical Magazines supplied.	Meetings held every
Blackburn	68	6*d.*	4/-	Yes	—	3 weeks in outside hall.
Brighton	74	*Nil*	1/-	—	Abandoned	2 weeks in Co.'s offices.
Chester	21	,,	*Nil*	—	—	2 weeks in Co.'s offices.
Glasgow	211	,,	1/6	Yes	Yes	2 weeks in Co.'s offices.
Hanley	24	,,	*Nil*	—	—	Month in Co.'s offices.
Liverpool	80	,,	2/-	Yes	Yes	2 weeks in outside hall.
London	350	1/-	4/-*	—	—	3 weeks in outside hall.
Manchester	134	6*d.*	1/-†	Yes	Yes	2 weeks in outside hall.
Sheffield	71	*Nil*	1/-	—	—	Month in Co.'s offices.
Southern (London)	All staff	,,	*Nil*	—	—	Month in Co.'s offices.

* To be reduced to 2*s*.

† For first five months' membership the subscription is 3*s*. 4*d*.

Each of the above-mentioned societies closed the year with a balance on the right side, and any centre desiring to form a society will, we believe, find sufficient information in the above table as regards fees, frequency of meetings, etc. The following items taken from the reports furnished are interesting:—Liverpool and Manchester each own a lantern and screen; grants are made in some cases towards the railway fares of men coming to the meetings from a distance; in some places members of the staff, although not members of the society, are invited to attend special meetings when the subject is thought interesting to any particular department; sometimes men from other districts are able to join in the meetings; and some societies give premiums for papers read at their meetings.

To those about to start societies the following remarks, arising out of considerable experience, may be useful:—

Don't meet too often—probably a fortnight is the very shortest interval that should elapse between meetings, and even this only in large places; for small places probably once a month is ample.

Don't try to start a library at once. If the society is small the number of books it can buy will soon be read by the members and then the interest in that part wanes.

Probably technical magazines can only be satisfactorily supplied by a society having either a large membership or a very compact staff.

The elected head of a society should be one who is able and prepared to give a lot of time to the committee and other meetings, and generally to do all he can to actively further the interests of the society. This position should be open to *any* member, and generally it is desirable that the period of office should not be too prolonged. Many associations and societies elect their presidents for one year only, and the other officials for two or three years.

If a society is to be really successful it is necessary that its driving force should come from within, and although the interest and influence of, say, the district manager is vital, particularly in the early stages, that alone cannot command lasting success. Every member should feel that some day he may be elected president of his society, and when this does happen he will recognise that he is in charge for his term of office, and will feel it incumbent on him to leave his mark on the annals of the society.

During the last session there has been a large number of papers, and taking the returns we have of 63 papers read in that session, we find that nineteen dealt with exchange equipment, nine with overhead construction, eight with instruments, seven with transmission, six with office, six with traffic, three with underground cables, two with contract, two with development, and one with electrophone working. This is an excellent record, and we have every reason to believe that the societies are doing splendid work not only for the Company but also for the members themselves; it is doubtful if there is a better way of stimulating and satisfying a healthy interest in the work we are engaged in than is provided by these meetings.

One hears sometimes the expression "I don't attend the meetings because they don't deal with my work." Surely there was never a more shortsighted view given expression to. A society ought to cover the whole work of the telephone field, and if it does not it fails to some extent; but equally true is it that to do so, it must of necessity deal with work not the speciality of any one individual. But that is a most powerful reason why anyone should attend these meetings. Surely we are all interested keenly in the telephone field as a whole besides being specially interested in one particular branch of it. What better method is there by which a man may keep in touch with the work done by the departments in which he is not engaged, and are not the chances of advancement immeasurably greater to one who is alive all round than to one who, however excellent, keeps his nose down on his own particular grindstone solely and shuts his eyes wilfully to what is going on around him?

Then with regard to writing papers, it is a well-known fact among those who have done so, that whatever the audience may gain from hearing the paper the author gains far more from writing it. The publication of a number of the papers in the JOURNAL affords men an opportunity of addressing a much larger audience now than was hitherto the case, and we feel sure that all these advantages will not be lost sight of by the keen members of the staff.

We hope that those places which are sufficiently large and yet have not formed societies will see their way to get their organisation working at an early date. It will be seen by the above table that it does not require a very large staff to enable a start to be made. Chester has a very scattered district and has a membership of 21, yet is doing very useful work (a meeting on Dec. 31 is surely a sign of enthusiasm); in the same way Hanley is entitled to credit with a membership of 24. Of course with larger places the work of running a society becomes easier, and the only question is as to why there are not more in existence. It is never too late, however, and we shall hope to publish news of the formation of other societies in subsequent issues. In another column will be found the programmes for the ensuing sessions so far as they have been received.

Distinguished Visitors.—Mr. C. F. CUTLER, President of the New York Telephone Company, called at the Company's Head Office in September during his visit to England. Mr. C. F. SISE, President of the Bell Telephone Company of Canada, was also in London recently. Mr. FEYERABEUD, of Hamburg, Mr. RUDOLF STAMPFL, of the Austrian Ministry of Trade, and Mr. J. L. V. W. JENSEN, Engineer-in-Chief of the Copenhagen Telephone Company, were among recent visitors to Telephone House.

HIC ET UBIQUE.

SOME writers in the daily papers have been exercised in their minds during the silly season concerning a word corresponding to *telegram*, applicable to a telephone message. We also have received letters from two correspondents advocating the use of *telepheme*, which exists in the Dictionary, is a good Greek derivative, and no hybrid.

Apropos of the Cambridge-Harvard race, it may interest our readers to know that Mr. J. W. NORTHMORE, of the London Contract Department, rowed in the Cambridge eight in 1889 and 1890. In another branch of sport, Rugby football, Mr. T. ELLIOTT, of Galashiels, has represented Scotland in its international matches, whilst it may not be generally known that under the Association code, Mr. C. EDWARDS, of the General Manager's Office, played for Wales *v.* Scotland, besides playing in the Wrexham eleven which won the Welsh Cup in the early days of Welsh football.

THE humorous side of canvassing provides some further stories, the contributor this time being Mr. J. S. RHODES of Birmingham. After shouting and gesticulating at a deaf old lady for nearly an hour and ultimately obtaining a contract from her, the canvasser's grief may be imagined when she said, "You will let me choose the tunes?"

THE same correspondent relates the happy effect of a neat pun. A doctor who was being urged to take a telephone said, "I shall need an increase of patience if I have the telephone." "There is no need to trouble about that," replied the canvasser. "An increase of patients would come naturally if you had the telephone." He was rewarded with a signed contract.

Another. A lineal descendant of Mrs. Malaprop was enquiring for the "contraction" office. None of the Company's departments answered to this description, as like the Fat Boy in "Pickwick," they are all "swelling wisibly"; but as the lady further explained that she wanted to *investigate* in a telephone, she was shown into the contract office.

HOLBORN VIADUCT FIRE.

By F. W. HOLDER, *Local Engineer.*

ON Sept. 12 a fire occurred at Nos. 47 and 48 Holborn Viaduct. The Company has a double standard on the party wall of these premises, carrying twelve 52-pair through cables and one 52-pair distributing on these poles. All cables were burnt through, thus disconnecting 341 exchange lines, 59 private lines, and 140 junctions from Holborn to Bank and London Wall Exchanges.

News of the fire was received at 9 a.m., and by 9.30 three gangs were present, and all cables were lashed to prevent their falling into the roadway.

A report appeared in one of the Sunday papers to the effect that "a large telephone standard had fallen, causing something like a panic amongst the densely wedged crowds." If this occurred, the standard was certainly re-erected and re-stayed on the party wall of the burning buildings in less than twenty minutes; this flight of imagination had as little foundation as the statement that the cables were ignited and falling about the streets, to the danger of adjoining properties.

By ten o'clock five additional gangs arrived from other local areas. Cables and suspenders were then pulled clear and new suspenders run out. Each cable had to be reconnected by jointing in a 20-yard length. By five o'clock the work of making the first seven joints was proceeding satisfactorily; at 4.45 p.m. on the 13th the first cable was through, and the last at 8 p.m. on the 14th.

Holborn being a central battery exchange, it was necessary to insulate these cables in the different testrooms to enable the work of tapping out and labelling to be carried on. A diagram showing positions of cables on the poles was particularly helpful, and I consider that where two or more cables pass through any pole each should be labelled with a lead label stamped with the cable code. This would be found very useful, especially in cases of fire.

Eleven pairs of jointers were employed throughout, working on twelve hour shifts.

CHANGE OF INSTRUMENTS FROM MAGNETO TO COMMON BATTERY PATTERN AT DERBY.

By M. B. OLDBURY.

THE transfer from the old premises to the new C.B. exchange was made on April 10, and the replacing of 900 magneto instruments by those of the common battery type commenced a week later, the change being at the time of writing, July 17, practically completed.

A description of the method adopted in connection with the fitting of the new instruments, and what is almost equally important, the recovery of the old apparatus may prove interesting in view of the fact that similar changes are likely to be frequent in the future.

In the first place a complete list of exchange and extension lines was obtained and from this an entry of each line was made

All instruments and apparatus were delivered to subscribers' offices by handcart, and the old material collected in each case after the change had been made. A reliable man was obtained and given charge of all deliveries and collections, and with the assistance of a boy was able to carry out this part of the work satisfactorily, although, of course, constant supervision was necessary. The man's instructions were written in a manifold book; sample page of which is shown in Table 2.

No.	Name.	Address.	Instruments.		Switch.	Hand generators.	Push.	Battery bell.	S.W.Bd. 158 F.	S.W.Bd. 158 G.
			Wall.	Table.						
677 X	Flint & Son	Full Street	1	...	...	...	...	...	...	...

TABLE 2.—Instructions for delivery of instruments.

No.	Name.	Address.	Instrument.		Switch 146 *d*.	Push.	Battery bell.	S. W. board.	etc.	etc.	etc.	Debit No.	Date fitted.	Credit No. for old inst.	Fitter.
			Wall.	Table.											
27 Y 1	Francis & Co. ..	St. James' Street ...	...	1	...	...	...	...	...	...	...	79028	7/5	189	H. B.
410	Tramway Office	Victoria Street ...	1	...	...	1	...	...	...	...	...	21804	2/6	37	R. D.
410 *a*	do.	do. ...	...	1	...	...	1	...	...	...	...	21805	2/6	37	R. D.
385	George & Co. ...	St. James' Street ...	1	...	...	...	...	...	...	...	...	79907	26/4	170	A. B.
296	Wykes & Francis	Wardwick	1	...	...	...	...	158 F, 1	...	...	...	6543	16/7	105	W. R.
296 *a*	do.	do.	...	1	...	...	...	...	...	...	...	6544	do.	105	W. R.
296 *b*	do.	do.	...	1	...	...	...	...	...	...	...	6545	do.	105	W. R.

TABLE 1.—Sample page of Record Book.

INSTRUMENTS HANDED TO I D.										SLIPS GIVEN IN EXCHANGE.									
Date.	Wall.	Table.	Switch.	Generator.	Push.	Battery bell.	etc.	etc.	Inspector's initials.	Date.	Wall.	Table.	Switch.	Generator.	Push.	Battery bell.	etc	etc.	Storekeeper's initials.
June 26	30	20	...	...	10	10	...	...	M.B.O.	June 27	20	5	...	...	5	5	...	...	D. A.
										,, 28	10	15	...	...	5	5	...	...	D. A.

TABLE 3.

in a foolscap book. The book was alphabetically indexed and written up in areas as shown in Table 1, the entries at the right-hand side of the address column being made after the instruments were changed.

In order to facilitate reference a numerical list was used giving the usual particulars, *e.g.*, number, name, and address of each subscriber, with an additional column showing the area in which his premises were situated. If then any particulars were required, such as whether a certain subscriber's installation had been changed, or the name of the fitter who did the job, reference to the numerical register gave the area, after which the entry in the record book was easily traced, and the necessary information obtained.

The instrument inspection cards are also being rewritten and brought up to date from the particulars contained in record book.

The fitters' orders were written from the above, and as each job was allotted, the entry was ticked on the right-hand side of the page, so that it could be seen at a glance which of the instruments delivered were not yet in hand for fitting. Each fitter carried with him in addition to his journal an instrument debit book, and had written on the inside of the cover the stock list numbers of the various instruments, etc., for quotation on the slips, with instructions that a debit slip was to be made out for the material used before leaving the subscriber's premises. These debit slips were handed in to the officer in charge of the fitting each morning together with a time sheet bearing in addition to the ordinary entries, the debit number for the material used on each job opposite its particular entry, and at foot of the sheet a summary of instruments changed, which had to agree with the slips handed in. The debit slips having been

checked were entered in record book *vide* Table 1. Summarised, the storekeeping arrangements were as follows – and it may be said in passing that at the recent stocktaking the instrument stores came out very well. The inspector in charge of the work advised the storekeeper that he required a certain number of instruments, etc., and these were handed in to the instrument department. After being checked they were signed for by the inspector in a stock book kept for the purpose, see Table 3.

With regard to the old apparatus, the fitters carried with them labels, one of which was attached to each instrument switch, bell, etc., giving date and description of apparatus. name of fitter recovering, and number and name of subscriber. The old material when brought in was stored in the instrument department until there were about 50 or 60 instruments, when they were taken into the stores and credited into stock, each instrument being entered separately on the credit slip with the subscriber's name opposite to the entry. As each instrument was handed to the storekeeper the label which had been affixed by the fitter was detached, the credit slip number added, and label retained by the inspector for entry in the prescribed column of record book.

It was found possible by this means to arrange that the number of old instruments brought into stock ready for despatch to the factory each week equalled the number of new ones fitted.

TESTING JUNCTIONS IN ELECTRICALLY DISTURBED DISTRICTS.

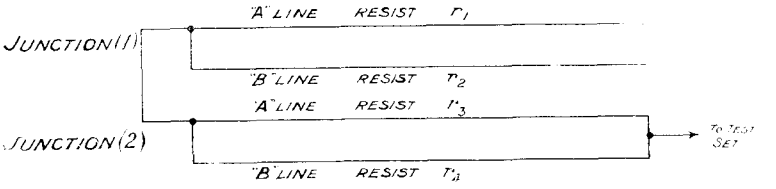
By S. H. Ings, *Leamington.*

Before the days of the now almost universal electric tram, the resistance of the "A" and "B" lines of a junction could be correctly ascertained by earthing at the far end and testing with an earth return, but as the area becomes more and more crossed by stray electric currents the effect on the needle of a galvanometer is so great that it is impossible to test them in this way. The alternative is of course to use another wire or wires as the return, and the question then arises as to what arrangement should be made which would be simple, speedy, and not involve the presence of two men. In the following I have assumed that the junctions are tested with a Silvertown set, those exchanges possessing a Weston voltmeter being in a decided minority, and in any case the method of obtaining the final results are the same. The following method was adopted: – The numbers of the junctions were painted on the test strips if not already clearly marked, and each exchange to which a junction was to be tested was provided with two wooden insulating plugs, also two ordinary test plugs joined together by a short piece of flexible wire, and the whole of the connections on each plug short-circuited. The tester provides himself with two plugs, with sufficient twin wire attached to reach the test set placed in a suitable position. Having arranged a time when there is practically no traffic he rings up the operator and asks her to put a white plug in, say, junctions (1) and (2). The act of disconnection is waited for on the ordinary test set, when the test plugs are inserted and the insulation data obtained. Digressing for a moment, I may say that the working out of results is much simplified by obtaining the deflection due to the equivalent of 1 megohm in series with the galvanometer; that is, if the known resistance on the bridge is 10,000 ohms use a shunt of 100, if of 50,000 use a shunt of 20 to obtain the constant. For example, suppose the deflection for equivalent of a megohm was 21 and deflection for "A" line with no shunt 4, then insulation resistance of "A" $\frac{21}{4}$ 5·25 megohms.

Having obtained the insulation resistance the operator is obtained in some other way, or waited for, and is asked to connect the two junctions together, which is done by simply putting the looped plugs in. The connections on the set are altered, care being taken that the ratio arms are removed prior to connecting the battery. The loop resistances of (1) and (2) are then obtained. A little difficulty here crops up if the junction is over 100 ohms, as the usual set only measures directly up to two figures. Thus No. (1) junction may be between 110 and 120 ohms. Suppose at 110 ohms the needle is deflected 5 degrees to the left and at 120 10 degrees to the right, the actual resistance is evidently nearer 110 than 120; it is, in fact, 110 + $\frac{5}{15}$ of 10 113·3 ohms. This proportion can generally be guessed sufficiently near.

Now for the "A" and "B" tests. Without taking the plugs out of the jacks both wires of junction 2 are connected to one terminal of the bridge, and the "A" wire of junction (1) to the other terminal. The resistance of this combination is found. The "A" wire is changed for the "B" wire and the resistance again noted. Both wires of junction (1) are then put together under one terminal, and the process repeated with the "A" and "B" lines of junction 2.

Appended is a diagrammatic sketch of the first connection—



Taking a concrete example to avoid confusion, suppose we obtained these results:

Loop of (1)	106
Loop of (2)	102
"A" line of (1) and junction (2) return	77·5
"B" line of (1) and junction (2) return	79·5
"A" line of (2) and junction (1) return	75·5
"B" line of (2) and junction (2) return	79·5

Now suppose resistance of two wires of junction (1) R_1 and of (2) R_2,

we have $r_1 + R_2$	77·5
$r_2 + R_2$	79·5
adding $r_1 + r_2 + 2R_2$	157
$r_1 + r_2$ is loop resistance	106
$\therefore 2R_2$	157 – 106 = 51
$\therefore R_2$	25·5

From equations (1) and (2) r_1 = 52 and r_2 = 54. Similarly r_3 and r_4 may be found.

This is the proof; but practically it may be obtained thus:

Divide the loop resistance by 2, thus $\frac{106}{2}$ 53.

Now add and subtract half the difference between the values obtained for "A" and "B" lines.

Thus: 79·5 – 77·5	2; half of 2 1.
"A" line	53 – 1 52 and
"B" line	53 + 1 54.

But, says the critic, suppose there is only one junction to the exchange? Answer, there is probably a through junction which can be utilised or the return can be plugged through on the switchboard of a third exchange—the ring-off does not matter.

FIRE DISCOVERED BY A "FAULT."

The prompt appearance of a fire brigade on the scene of action is due in a great measure to the development of the telephone system, but that the severing of the wires of a telephone should lead to the discovery of a fire, as evidenced by the following incident, is somewhat unusual.

In consequence of an interruption on the circuit of a Birmingham subscriber's telephone, a National Telephone official was tracing the line on Aug. 14, when he noticed smoke proceeding from a disused building and immediately called a policeman's attention to it. The latter entered the premises and finding the floor alight summoned the brigade, and the fire was thus speedily extinguished.

On investigation it was found that all the lead and metal fittings in the building had been removed by thieves who had even cut away a considerable length of telephone cable. A fire had evidently been started on the floor to enable them to burn off the covering of the cable, at all events the wire itself had been carried away and the fire left burning, which, but for the speedy following up of the fault, would have quickly enveloped the building.

TELEPHONES AND TEMPER.

By J. R. THYNE, *Glasgow.*

THE combination suggested above is unhappily not a rare one, and although there may be some difference of opinion as to the exact relationship of the elements, there can be no doubt that the one is very powerfully affected by the other.

It is a noteworthy fact that men who, during conversations by telephone had been unreasonable and impolite, have proved themselves conciliatory and courteous when brought to a face-to-face interview. The change cannot always be ascribed to the herculean appearance or apparent muscular development of the interviewer, but can be accounted for to a large extent, I think, by an impression which has somehow got root, that the telephone user enjoys a special license, and that the rules of polite society governing ordinary intercourse do not apply to him.

Why is it that so much temper is associated with the telephone? I have not now in view those visits received from subscribers who, owing to some trouble just experienced, are not at the moment inclined to bless the telephone service, because such visits are now happily rare, but I refer more to the way in which the telephone is frequently regarded.

For instance, who has not heard expressions of opinion something like these: "Oh, I have enough of the telephone during business hours, without being worried with it at home," or, "The office is bad enough with one connection, what would it be like with two?" Now is not this attitude mostly due to little irritating outbursts of temper which might easily be avoided?

Such replies as the above, of course, show clearly that they are the result, not of the *use* but of the *abuse* of the service. If enquiries were made, it would probably be found that at our friend's place of business the solitary telephone connection installed was made to carry more than its fair share of traffic, and that the answering of the bell was left to that clerk or office boy who happened to be passing the instrument or whose sense of duty was most keen. In such circumstances, the caller loses his temper in his vain attempts to secure attention, the operator is distracted by his insisting that he is not properly connected, the office chief at the answering end interferes, being annoyed by the constant ringing of the bell, the otherwise busy clerk growls because he has to leave his work to attend to it, the whole office staff is upset, and it can hardly be wondered at if the ensuing conversation is not altogether a success. Should the caller happen to be the principal of the firm or an important customer, subsequent events do not improve matters, but rather furnish ground for further complaint against what is, of course, the cause of all the trouble, that "nuisance of a telephone." With such experience, is it surprising that our friend will not consider a house connection?

Another reason or excuse for irritation, however, as has frequently been pointed out, is the fact that the person at either end of the wire, in the event of some little difficulty occurring, is entirely in the dark as to what is transpiring at the other end. Increased advantages, however, bring increased responsibilities, and it is just here, when we are called upon to "walk by faith," called upon to take the party at the other end on trust, that the telephone calls for increased self-command.

JEROME K. JEROME, in one of his sketches, gives a fancy picture of how, wishing a connection, he presses the key, lifts the receiver from the rest, and with eager expectancy places it to his ear. After the lapse of a second or two, however, the white heat is off his expectancy, his left elbow has found a convenient resting place, and there, with the receiver firmly to his ear, he falls adreaming. He recalls the days of his youth, the old home with its familiar associations rises in his imagination, and he begins to wish that he had been kinder to his sister when a boy, etc., etc.—and all this while he waits for the operator. I am afraid that it is not in this repentant spirit that the average subscriber endures such a delay; rather is he paving the way for the fuller exercise of that spirit later.

Many must have heard the story of the little fellow who was told that for his occasional outbursts of temper "Ipse" was responsible, and that if he succeeded in mastering and controlling "Ipse" they would disappear entirely. I think there is a moral here for telephone users, and if, when the inevitable little difficulty crops up, instead of saying "a word or two," we see to it that "Ipse" is all right, the trouble will be half over.

The telephone service, even as we have it-day, represents one of the greatest attainments of the scientific world, and as such calls for in the user thereof not only intelligence, but the possession of that self-command and dignity which characterise the cultured mind.

MNEMONICS APPLIED TO OPERATING RULES.

By H. DEANE, *Traffic Department, London.*

I HAD occasion the other day to refer to a Latin grammar, and was struck with the host of exceptions to the general rules which relate to the gender of Latin nouns. I could not help thinking, however, that I could not possibly have acquired these when at college, had it not been for the doggerel rhymes which incorporate all such exceptions. I was then struck with the idea that such rhymes—which are easy enough to compose—might be applied with good results to learn certain rules in operating, difficult things to remember, etc., which considerably hamper learners in the operating school, and which are only acquired after constant application. I may mention, for example, the following as being difficult to remember:—(1) Inner London exchanges, (2) the colour and marking of subscribers' line signals, (3) multiple pegs, (4) multiple jack marking. I claim that a great deal of trouble might be saved both in teaching and learning if operators were made to learn rhymes and not simply lists of things. I have composed a considerable amount of doggerel for the benefit of learners when the new operating school in London opens, and I give below two examples of the same to illustrate my meaning. These examples refer of course to the London service.

(1) *List of Inner London Exchanges.*—It is necessary for all operators situated at exchanges in the county of London to know these, because if a county of London message rate subscriber makes a call to any subscriber outside the county of London he is charged a double fee.

These exchanges "inner" call
Holborn, Bank, and London Wall,
Hammersmith, and Paddington,
Westminster, and Kensington;
Both the Hampsteads; Battersea,
Deptford, Sydenham, and Lee,
Woolwich, Streatham, and Brixton,
Mayfair, Western, and Dalston,
Putney and Victoria.
Then do follow those that are
Chief from many points of view—
Gerrard, Hop, and Avenue,
Also Central, North, and East.
That is all—the list has ceased.

(2) *The Opal Code as applied to the London Services.*—This is also a particularly difficult thing to remember under ordinary circumstances.

In case of calls from opals white,
No fees demand nor memos. write;
And if the opals light up green,
A pad or ticket's what they mean;
But should the opals glow bright red,
Be sure to ask for fees instead.
If any opal barred it is
No "trunks" nor Post facilities.
Dots in the centre all portend
A call box at the other end
(I don't mean small dots two and one,
Both which denote electrophone).
To subs. with opals marked with T
No London calls allowed should be.
To those whom S we do assign,
They cannot talk outside the line
(Unless an orange-coloured pad
Be used for all such calls they've had).
Should T light up at the switchboard,
All junction calls you must record;
And if an R should catch your eye,
Refer to special note close by.
All lamps with lines in parallel
Of two subs. on one line do tell.
Two-party opal Y or X
Implies *that* sub. no bar expects.

It is of course understood that I only wish to illustrate a principle by means of the above, and not my capacity for composing verse.

CORRESPONDENCE.

SUBSTITUTION OF CABLE.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I WAS interested in reading Mr. Perkins' article anent drawing out cables, for two reasons. Firstly, I expect I was concerned in drawing in the said original cables, and, if I remember rightly, Mr. Perkins said "Let's have plenty of grease"; secondly, that I had a somewhat similiar experience at Gloucester last year in drawing out 102 and 52-pair cable which had been laid between five and six years. We were very successful with several lengths, but found it necessary to start with a winch; in one case with a 102-pair our gear broke up several times; however, with perseverance we got it through, and, upon investigation found that the cause of the trouble was the original packing of tow and tallow round the cable at the bell mouth not being picked out before starting. Is Mr. Perkins sure this had nothing to do with his trouble? Also, is he not a little out in the age of the cable? I thought the cable he referred to was laid about 1899 which would not be very much before that at Gloucester, also laid under Mr. Perkins' *régime*.

This point, being the basis of Mr. Perkins' deductions, is somewhat important, and perhaps I may therefore be forgiven the presumption of questioning the figures.

W. E. GAUNTLETT, District Manager.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

As considerable interest has been manifested in the substitution of cables both at Liverpool and London, perhaps a few words on the same class of work carried out at Dublin will not be out of place.

Although not so large an undertaking as that in London, still the cost of handling the cable will probably be of some interest to readers of the JOURNAL.

The length of cable to be drawn out was 363 yards of 52-pair, and was substituted for the same length of 300-pair, making a total of 726 yards of cable to handle.

As the ideal method of transferring the working subscribers into a spare cable would have involved a great loss of time and considerable interruption, it was decided to do the work during the Saturday night, advising the subscribers that their service would be cut, but connected again as early as possible on Sunday.

Everything was in readiness to cut the cable by six o'clock in the evening, but as it was raining very heavily a start was not made until eight o'clock, and no time was lost until the substitution of the cable was completed and ready for the jointers.

Owing to the close proximity of the tram rails, the cable was pulled straight out by hand in these lengths, laid alongside the wall and drummed after the cars had stopped running.

The work was carried out by fourteen men and a foreman, and the following are the hours taken for the various operations:—

			Man-hours.	Man-hours Per yard.	
6.0 p.m. to	8.0 p.m.	time lost by rain ..	31·0	·042	
8.0 ,,	10.30 ,,	drawing out cable ..	38·5	·053	
10.30 ,,	11.30 ,,	lunch	—	—	
11.30 ,,	3.30 a.m.	drawing in cable ..	88·5	·120	Overtime
3.30 a.m. to	6.0 ,,	drumming cable, etc. ..	57·5	·081	
6.0 ,,	7.0 ,,	preparing for jointers ..	23·0	·030	rates.
			238·5 hrs.	·326 hrs.	

Length of cable handled, 726 yards.

The cost worked out at a little over 1¼*d.* per yard, and the actual time taken to draw out and drum the cable was .. .. ·134 hours.

Time drawing in cable .. .. ·120 ,,

Time lost and preparing for jointers .. .. ·072 ,,

·326 hours.

The cable was drawn in in two lengths, making three joints in all, and jointing was commenced at 7 a.m. All the subscribers—40 in number—were working in the new cable at twelve noon, making a total stoppage of service of only sixteen hours.

The work was carried out under the supervision of Engineering Inspector Dalgity. "DUBLIN."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE trouble experienced by Mr. Alfred Perkins, of Bristol—related in your August number—in drawing out a cable which had become firmly attached to the pipes by reason of the lubricant getting hard, is not a new one and perhaps you will allow me to suggest that a few gallons of paraffin oil poured into the pipes would have solved the difficulty and would certainly have cost less than damaging some yards of cable, to say nothing of the saving of time.

London, Sept. 6, 1906. LANCASTRIAN.

RENTAL REGISTERS AND FAULT CARDS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MR. G. F. GREENHAM'S letter regarding the "New Fault Card System" will no doubt be perused with pleasure by other electricians who have experienced the limitations and disadvantages of the ordinary fault card in connection with large installations, and who have not yet tried the new cards (Sch. 1,474 and 1,474*a*), which will probably minimise the trouble in this respect, although in cases of installation over 32 stations the old objection is apparent (*i.e.*, more than one card has to be used).

The trouble mentioned by me, however, in my article in the August JOURNAL referred more especially to the new form of rental register than to the fault cards, although both are involved.

Perhaps some of my London colleagues will inform me of the method they have of obtaining details of a subscriber's installation, seeing that there must be a dozen or more instrument departments (each with its fault card cabinet) connected with the Metropolitan area, whilst the contract department and the accountant's office is at Salisbury House, and according to the S. I. Book, F 23, page 6, paragraph 6, the junction wires must not be used for service purposes between the hours of 10.30 a.m. and 4.30 p.m.

Liverpool, Sept. 12, 1906. A. C. GODFREY, Chief Clerk.

INSULATION TESTING.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IT is difficult to answer the question which "Sheffield" has raised without knowing the exact circumstances under which he was testing. Supposing, however, he tested according to the instructions, the results he obtained were only what one would expect, for in his first test he would get a result due to the leakage between the "A's" and the "B's," whereas in the other tests his results would be due to the leakage between the "A's" he was testing and the "B's," plus the remaining "A's." Had "Sheffield" during his second test not earthed the remaining "A's" he would have found the deflections to be approximately proportional. "DRY CORE."

RELAY FAULTS.

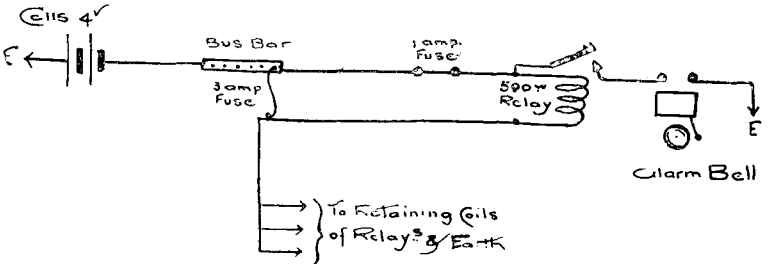
TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I NOTICE in the August number of the JOURNAL a paragraph entitled "A Relay Fault," in the course of which the writer relates the trouble caused by the blowing of a sectional fuse. The fact of his attention being drawn to the matter by a complaint received from a subscriber proves *that the fuse must have been blown for some time*.

In connection with this trouble, the following may be of some interest to the writer in question and others:—

In an exchange where I have worked, precisely the same trouble was experienced, due to a similar cause, not only once, but often, as the frame or rack on which the relays were fitted was often subject to jarring, caused by men working on or contiguous to it.

The fuseboard *not* being fitted with spring clip fuses, the difficulty was got over by joining up a high resistance relay across the terminals of the fuse, together with an alarm bell. The attached rough sketch will explain.



The action is as follows:—

Owing to the very high resistance offered by the coil of the relay (500ω) as compared with the fuse, little or no current passes through the relay, the armature of which remains in its normal position.

Directly a short circuit occurs, *i.e.*, relay rack being jarred, etc., there is a corresponding increase of current in the circuit which immediately blows the fuse.

Then, the next subscriber who rings the exchange has his retaining circuit completed (*pro tem.*) through the coil of the 500ω relay actuating same and ringing the alarm bell, thereby *automatically* drawing attention to the fact that the fuse was blown and required to be replaced.

The above method was brought under the notice of the Engineer-in-Chief some twelve months ago, and acknowledged by him in due course.

Dublin. R. H. GILLILAND, Switchroom Inspector.

BENEVOLENT FUND.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

Now that the Benevolent Society has been started it is very desirable that the membership and the funds should be as large as possible. To this end may I ask consideration of the following suggestion:—

That the subscribers to the weekly collection for the Hospital Saturday Fund should transfer their contributions to the Benevolent Society, on condition that half the amount collected be paid over to the hospital fund and the other half to the society. At first sight this proposal may appear to be unkind to the hospital fund; but what is really the object of the weekly collection? Is it not that hospital tickets shall be obtainable for members of the Company's staff? So I may ask, what is the new society for if not for the relief of distressful cases amongst the same class of persons? If we could be sure of raising enough money for both purposes, well and good—there is neither hostility nor rivalry between them. But the objects are distinct, and it is not to be supposed that the amount now collected can be permanently doubled. It would seem, therefore, to be a better plan to help both collections in the way that I have suggested, and then as the amount increases—and I hope it may increase—both funds will gain proportionately.

The secretary would, of course, apply for as many tickets, both for in and out-patients, as he could obtain from the hospital fund under the new conditions.

The tickets which Mr. Waller holds from the Middlesex Hospital should, I

suggest, be available for members of the Benevolent Society, and not for the late Western staff only. And all cases should go through the secretary's hands.

I should be glad to hear the opinion of other members of the staff.

A WELL-WISHER.

OPERATORS' PROVIDENT SOCIETY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MAY I trespass on your space to inform your readers of the progress of the National Telephone Operators' Provident Society.

As previously reported in your columns, this society was formed with the object of providing sick pay for members of the traffic staff during periods of illness. The society commenced operations from July 1, and 695 members were registered during that week. Since then the progress has been as follows:—

22 in the week ending July 20, 1906.
19 ,, ,, ,, 27, ,,
16 ,, ,, August 3, ,,
36 ,, ,, ,, 10, ,,

making a total of 788 members.

While the committee are satisfied with such splendid results they, at the same time, feel that there must be still a large number of the staff who have not availed themselves of the benefits of the society, and the secretary would remind all the members of the London traffic staff, that members can be enrolled at any time, and that he would be pleased to correspond with any exchange or district where further information may be required.

I would also like to add that should the provincial districts desire to start a similar society, copies of rules, etc., will be forwarded with pleasure.

The address of the secretary is 9 Marshalsea Road, Borough, London, S.E.

C. W. PIGGOTT.

SPECIAL INTERLEAVED DIRECTORY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

A CONSIDERABLE difference of opinion exists between districts as to where and how the special Interleaved Directory should be kept.

The chief point open to discussion is whether the book shall be entered up by the district, local, or switchroom staff, and duplication of work avoided.

Briefly stated, the operating department undoubtedly make the most use of the Interleaved Directory, and it would consequently seem advisable that the book should be kept in the switchroom and entered up by a properly appointed member of the staff under the direction of the switchroom manager or clerk-in-charge, but not by the clerk-in-charge herself except in the smaller exchanges. Such frequent references have, however, to be made to the Directory to satisfy enquiries for the numbers of new subscribers, etc., that it is essential the operating department have easy access to the information therein contained.

In order to carry out the work in a thorough and systematic manner, and prevent interference with operating, adequate clerical assistance should be given to the switchroom manager or clerk-in-charge, and the proper keeping of all details affecting the Directory and Numerical Registers (new entries, alterations, ceasements, removals, advising sub-exchanges of such as may be necessary, etc.) should be included in the work allotted to the staff employed in the switchroom.

Passing all works orders affecting new entries, alterations, etc., through the hands of the official responsible for the books presents an easy method of securing the entry of all information, and the initialling of the works order when the entries have been made.

No doubt some of the readers of the JOURNAL will express their opinions on the subject to assist in arriving at a uniform practice.

Plymouth. PERCY F. CURRALL.

AN AMERICAN SPEAKER ON TELEPHONE "RUSHES."

AN address on the "Telephone Girl," delivered at a banquet at Peoria, Illinois, contains the following:—"If I go into my grocery store on Saturday night, when every clerk is on the jump, and yell that I have an important social or business engagement and demand that the clerk leave the customer he is waiting upon and attend to my wants because my business is almighty important, the proprietor tells his clerk that the rule in that store is to wait on people, rich and poor, in the order in which they come in, and that is the only way in which he can do business, and he informs me that he is very sorry but that if I will have a little patience I will be waited upon soon. I yell at him and want to know why in the thunder he doesn't get clerks enough to attend to his business. He tells me that he does, but he cannot afford to hire a half-dozen extra clerks to take care of a rush of an hour on Saturday night and let them sit around for the rest of the week. Yet this same merchant will take the head off the poor telephone girl because there are rush times in her office, when the shutters fall like snowflakes in a mountain storm, during which she is unable to answer his telephone in a fraction of a minute. He calls up the manager and tells him that he uses his instrument more than anyone else in town (that is, he gets more for his money than anyone else), and intimates that unless his telephone is answered at once he proposes to go to the City Council and see what can be done about rotten service. The butcher complains about the blundering telephone girl, and makes the air smell of sulphur every time she gives him the wrong number, but he sings mighty low when I tell him that I go home and find my wife in tears because she has company for dinner, ordered her meat at nine o'clock, and the blundering delivery boy took it to the wrong house. He tells me not to be unreasonable; he hires the best help he can get, but that mistakes will occur. Yet the same men forget that a thousand subscribers may want to talk, all at once—they have a right to, even at night. They will not grant the same consideration to the telephone business they demand for themselves."—*Telephony*, Chicago.

SYLLABUS OF TELEPHONE SOCIETIES, SEASON 1906-7.

LONDON.

Preliminary announcement. First three papers:—

Transmission. By B. S. COHEN.

Junction Working. By H. DEANE.

Hotel Installation and Wiring of Large Systems. By A. SKINNER.

GLASGOW.

Nov. 7.—Principles of Electric Wave Telegraphy. Prof. MAGNUS MACLEAN, D.Sc.

Nov. 21.—Traffic Organisation. T. RODGER.

Dec. 5.—The Office and Some of Its Functions. A. M. WATT.

Dec. 15.—Telephone Transmission Measurements. B. S. COHEN.

Jan. 16.—Contract Department Working. J. R. BROWN.

Jan. 30. Testing Cables and Open Wires. J. W. WARNOCK.

Feb. 13.—Telephony on the Continent of Europe. H. LAWS WEBB.

Feb. 27.—Technical Terms. T. PETTIGREW.

Mar. 27.—Annual General Meeting.

HANLEY.

Oct. 19.—Silvertown and Bridge Methods of Testing.

Nov. 16.—Distribution Boxes.

Dec. 14.—Intercommunication Sets.

Jan. 20.—Traffic Returns.

Feb. 17.—Faults and Statistics.

Mar. 17.—Underground Work.

CHESTER.

Sept. 10.—The Receiver. J. C. JONES.

Sept. 24.—Transmitter and Indicator Coils. T. STAPLEY.

Oct. 8.—Protection of Telephone Lines. G. BROWN.

Oct. 22.—Guernsey Telephone Service. H. COYLE.

Nov. 5.—Party Line Working. J. C. JONES.

Nov. 19. Faults J. G. FERGUSON.

Dec. 3. The Erection of Aerial Cables. E. A. PEARSON.

Dec. 31. Effect of Resistances on Telephone Circuits. G. BROWN.

Jan. 7. London Telephone Service. H. COYLE.

Jan. 21.—Aerial Construction. T. FLANAGAN.

Feb. 18. General Testing. J. C. JONES.

Mar. 4. Underground Construction. T. FLANAGAN.

Mar. 18. Switchboard Working. J. C. JONES.

BLACKBURN.

Oct. 5. Power Plants. C. REMINGTON.

Oct. 26.—Outside Wiring: Its Advantages and Disadvantages. F. MOORE.

Nov. 16.—Maintenance of Exchange Switchboards. R. CHAMBERS.

Dec. 7.—Electrical Testing as applied to Telephone and Telegraph Lines. W. J. STOREY.

Jan. 11.—General Construction of Aerial Plant. W. HOOD.

Feb. 1. Underground Difficulties: Transmission. G. FROST.

Feb. 22.—Local Supervision and Management. H. CALLIS.
Points in District Office Work. G. STEVENSON.

Mar. 15.—Open Night.

NEWS OF THE STAFF.

W. F. TAYLOR, Contract Agent, Glasgow, has been appointed Contract Manager in London, and Mr. MOORHOUSE has been appointed to replace Mr. Maclure at Brighton. Mr. Taylor had an agreeable surprise on the eve of his departure for his annual holiday, which, by the way, embraces a trip to America. He found on his desk a large box of cigars and cigar case, with a small note as follows:—"To Mr. W. F. Taylor, Contract Agent, with the best wishes of the contract department staff for a pleasant holiday and a safe return."

Mr. H. A. FAULKNER, Local Manager, Watford, formerly Windsor, has left the Company's service.

Mr. W. H. ANDERTON, Inspector-in-Charge, Tonbridge, has been appointed Inspector-in-Charge, Maidstone.

Mr. E. L. BLAKE, Wayleave Officer, Tunbridge Wells, has been appointed Inspector-in-Charge, Tonbridge.

Mr. J. LAW, Contract Agent, Plymouth, has been appointed Chief Clerk, Canterbury district.

Mr. J. H. C. BUCKLITSCH, Chief Inspector, Greenock, has been transferred to Glasgow as Assistant Engineer. Before leaving, Mr. Bucklitsch was presented with an oak bureau by the Greenock district staff.

Mr. R. BRUCE, Local Manager's Clerk, Belfast, has been promoted to the position of Engineering Inspector.

Mr. N. A. SALTMARSH, Local Manager, Gravesend, was transferred as Local Manager to Watford, on Sept. 17. Before his departure he was the recipient of a smoker's companion, as a mark of esteem from the staff at Gravesend.

Mr. G. W. CRADDOCK, of Maidstone, succeeds Mr. Saltmarsh as Local Manager, Gravesend.

H. C. TOWNSEND, Local Office Clerk, Cambridge, has passed 2nd class in Telegraphy and Telephony, Ordinary, City and Guilds.

Mr. W. Fred COOMBES, for many years in the Provincial Superintendent's office at Bristol, on the occasion of his resigning from the Company's service, was the recipient from the superintendent and his staff of a token of the high esteem in which he was held by them.

Mr. F. C. STEVENS, of the Engineering staff, Bristol, has been transferred to Plymouth as Assistant Engineer.

Mr. F. SPICKETT, Storekeeper's Assistant, Bristol, has been appointed Storekeeper, Bath.

Mr. A. E. COOMBS has been appointed Exchange Manager, Swansea. Mr. Coombs entered the Company's employ in August, 1900, as Cashier at Cardiff district office, and was transferred to Swansea as Observation Officer in September, 1904.

Miss A. W. KELLEHER has been appointed Observation Clerk, Swansea.

R. J. SKELTON and D. N. SKELTON, Leeds, passed the Ordinary Grade, 1st class, Telegraph and Telephony examination of the City and Guilds Institute, and D. N. SKELTON also took a 1st class in the South Kensington examination for Magnetism and Electricity.

Inspector P. W. WHIBLEY was transferred from Tunbridge Wells centre to the City of London district on Aug. 27. Before his departure he was the recipient of a dressing case by his fellow-employees at Tunbridge Wells.

Miss STOCKALL and Miss ROSIE HART, Operators (Birmingham central), have been promoted to be Supervisors.

Miss J. CANN, formerly of the Contract and District offices, Portsmouth, has been appointed Observation Clerk at Bristol.

The following students of the Bristol staff have passed the undermentioned examinations of the City and Guilds of London Institute:—Electrical Engineering, Ordinary Grade:—1st class: L. F. Morice; 2nd class: F. C. Green, W. C. Harris. Telegraphy and Telephony, Honours Grade, 2nd class: A. G. Ellis, H. H. Kinscote, F. J. Spray; Ordinary Grade, 1st class: A. W. Ashbee, J. E. Burt, F. C. Green, E. G. Jenkins. Advanced Magnetism and Electricity: F. C. Green.

Mr. H. M. POPE, Torquay, was presented with a silver cigarette case and matchbox by his friends of the Torquay staff, on leaving to take up position as Assistant Engineer at Swansea.

Mr. H. JULIUS MACLURE, who has recently been appointed Contract Manager at Birmingham, was, prior to his leaving Brighton, made the recipient of a handsome case of fish knives and forks, large and small spoons, etc., subscribed for by the Brighton staff.

London Traffic Department.—*Promotions and transfers for September.*

Miss E. M. ALESBURY, Operator, Westminster, to be Supervisor at Gerrard Exchange.

Miss B. COOPER, Supervisor, Brixton, to be Senior Supervisor-in-Charge at Streatham Exchange.

Miss J. DECKER, Operator, London Wall, to be Supervisor at East Exchange.

Miss J. DREW, Supervisor, Gerrard, to be Supervisor at Avenue Exchange.

Miss H. EVANS, Operator, Stratford, to be Supervisor at East Exchange.

Miss J. HILEY, Supervisor, Avenue, to be Supervisor at Gerrard Exchange.

Miss A. SAYERS, Operator, London, to be Supervisor-in-Charge at Enfield Exchange.

Miss L. YATES, Operator, Gerrard, to be Supervisor at Kensington Exchange.

MARRIAGES.

Mr. ALFRED G. MALTBY, Exchange Inspector at Hop Exchange, London, was on the occasion of his recent marriage presented with a set of forks and spoons by the various staffs connected with the Hop Exchange.

Mr. A. W. GUY, Local Office Clerk, Oxford, has been presented by the Reading and Oxford staffs with a clock on the occasion of his marriage.

Miss E. GURNEY, late Operator at the Long Eaton Exchange, was married on Sept. 6, and was presented by the operating staff in the Nottingham centre with a trinket set.

Mr. G. H. CARRIER, Stores Clerk, in the district office was presented by the members of the Nottingham district and local staffs, on the occasion of his recent marriage, with a *jardiniere* and coal vase.

Mr. G. W. FAWCETT, Linesman Inspector of the Middlesbrough centre staff, was married on Aug. 21. A large number of the staff attended in the evening at a reception, held at the Co-operative Hall, when he was presented with a pair of bronzes from the local staff.

Miss S. A. HOSKIN and Miss M. DAVIDSON, Operators, Blackburn Exchange, have resigned to be married.

Mr. J. B. RYALL, Electrician to the City district, London, was married on Aug. 23. His colleagues and others on the staff presented him with a Sheraton writing bureau and set of fish knives and forks as a memento of the occasion.

W. SANKEY, Foreman, Warrington, was presented with a handsome pair of bronzes and a tea tray by the combined inside and outside staffs of Warrington on the occasion of his marriage, which took place on Aug. 25.

Miss R. REEVES, Brighton Central Exchange, has resigned to be married and has been presented by her colleagues with a pair of silver-mounted cut-glass scent bottles.

Miss M. COLLINS, of Kemp Town Exchange, Brighton, has resigned to be married, and has been presented by the Kemp Town staff with an upholstered wicker chair.

Mr. J. BURROUGHS, Instrument Fitter, Hull, was presented by the staff with a handsome walnut overmantel on the occasion of his marriage, Sept. 6.

Mr. F. HUNTER, Rental Clerk, Hull, was married to Miss E. M. BARRICK, Supervisor, Hull Exchange, on Sept. 8. They were presented with a clock and side ornaments, suitably inscribed.

Mr. A. PADGET, Chief Inspector, York, and Miss A. PRINCE, until recently one of the Senior Operators at the York Exchange, were married on Sept. 11. They have been presented by the staff with a handsome eight-day clock.

Mr. W. F. GREGORY, Instrument Inspector, was presented with a cruet, subscribed for by the Bristol staff, on the occasion of his marriage, August, 1906.

Mr. WILLIAM WHIPP, Rental Register Clerk, and Mr. E. HOPPER, Inspector, Blackburn, have recently become Benedicks and were presented with a set of hall brushes and a case of carvers respectively.

Miss M. E. DAVIES, Junior Operator, Cardiff, left the Company's service on Aug. 9, and was married on Aug. 30. Prior to leaving she was presented with an electro-plated tea service and teaspoons.

Miss ALICE COOKSLEY, Senior Operator, Cardiff, left the Company's service on Aug. 30, in view of her approaching marriage, and was presented with an electro-plated tea service, teaspoons, and carver rests.

Mr. FRANK SCEATS, Assistant Engineer, was married on Aug. 7 to Miss LENNARD, late of the district office. They were presented by members of the staff with a dinner service

Miss KIDD, Typist, Liverpool district, recently left the service to be married. She was presented by the members of the staff with an electro-plated teapot, etc.

Miss H. LEWIS, Fee Clerk, Swansea, on the occasion of her resigning to be married, on Sept. 6 last, was presented by the staff with a handsome silver fruit dish, as a mark of esteem. Miss Lewis had been in the Company's employ for five years.

London Traffic Department.—Resignations to be married:

Miss M. FUGEMAN, Supervisor, East Exchange.
Miss E. MARTIN, Operator, Gerrard Exchange.
Miss F. E. SMITH, Operator, Gerrard Exchange.
Miss E. O'BRIEN, Operator, Gerrard Exchange.

OBITUARY.

Mr. T. MURRAY.—The Canterbury district office staff have sustained a serious loss in the death of their Chief Clerk, the late Mr. Thomas Murray, who, whilst spending his holidays at Glasgow, succumbed on Sunday, Aug. 26, to an illness of several years' duration. Mr. Murray was an old servant of the Company, having commenced his career with them some ten years ago in the Glasgow district office. In 1900 he was appointed Chief Clerk at Guildford, and three years later was transferred to Canterbury in a similar capacity. Mr. Murray was very popular with the whole of the staff with whom he came in contact in the East Kent district, and his cheerful manner and kindly consideration towards those with whom his duties brought him in more immediate relationship made him very greatly respected. Mr. Murray will be remembered by readers of the JOURNAL in connection with his letters in recent issues on the subject of filing correspondence. A telegram of condolence was despatched to Mrs. Murray by the East Kent staff, who also sent a wreath.

Mr. A. BRIDGER.—It is with deep regret that we have to report the death of this Canvasser, who was suffering from a throat complaint. He entered the service in October, 1896, and has served in the Tunbridge Wells, Southampton and Portsmouth, and Isle of Wight districts.

STAFF GATHERINGS AND SPORTS.

Edinburgh.—A cricket match was played on Sept. 8 at Stewart's College Grounds, Edinburgh, between Galashiels and Edinburgh districts. Galashiels batted first, scoring 174 runs for three wickets; T. Elliot, of Rugby International fame, compiling 102 not out. Edinburgh responded with 69 all out; the only batsman to make any stand being Mr. J. D. W. Stewart, 23. The game, which is the second played between the districts, is now regarded as an annual one. The District Managers, Messrs. McFarlane and Stewart, have taken part in both games, and this year the presence of the fair sex of the Edinburgh office, who served tea in the pavilion, added not a little to the pleasure.

Ampere Golf Club.—The final of the hole and hole competition was played over the Braids Hills course on Saturday, Sept. 1, when, after a keen contest, Mr. J. A. Swanson (scratch) defeated Mr. J. B. Haig (scratch) by two up and one to play. The last competition (foursome) for the season has been arranged, and should produce some interesting games. As inter-district cricket

and football matches have proved successful, it is hoped that inter-district golf competitions may be arranged next season, and the secretary of this club will be pleased to hear from golfers in other districts not too remote.

Portsmouth.—The outdoor staff of the Portsmouth centre arranged a very enjoyable outing on Saturday, Sept. 8. A party of 50 went by brakes to West Dean, a distance of 22 miles from Portsmouth. A dinner was arranged at the Selsey Arms, West Dean, and tea at Westbourne. As regards sports, the members enjoyed a tug of war, and games of baseball and football were also played. A smoking concert was held in the evening, and the party returned to Portsmouth a little before 12 p.m. having thoroughly appreciated a fine day's outing.

Dublin District.—*Association Football Club.*—A meeting was held on the 13th inst., Mr. E. J. Jarrett, local manager, in the chair. The business included election of officers for the coming season. Mr. F. Cowley, superintendent for Ireland, was elected president. The club has entered a team for the junior league, and a successful season is looked forward to.

Wolverhampton.—The North Midland district staff held their first annual picnic on the 1st inst., when the Wolverhampton staff, accompanied by the district manager, proceeded by train to Stourport. The Walsall and Dudley staffs joined the party *en route*, and met the Worcester staff at Stourport. After tea, at the Tontine Hotel, the party went down the river in a pleasure steamer to Holt Fleet. The weather was delightful, the trip on the Severn most enjoyable, and the picnic turned out a great success.

Swansea.—The indoor staff held their second 1906 outing on Aug. 25, when a party of 55 journeyed to Parkmill by brake, Coleridge House, Mount Street being left about 2 p.m. Notwithstanding its promise, the weather proved beautifully fine. All catering arrangements were carried out by the staff, Messrs. J. Hagan (contract department) and R. T. McCahey (chief electrican) being at the head of this department. An excellent repast was provided.

Liverpool.—The annual staff picnic of the Liverpool district took place on Saturday, Aug. 18, when over 100 members and friends visited Eccleston Ferry, near Chester, where a very enjoyable afternoon was spent.

Coventry.—The staff working in the Coventry centre of the South Midland district had their first annual picnic on Saturday, Sept. 1. The venue was Ashow, where tea was served by the river side. Afterwards the staff, through the courtesy of Lord Leigh, strolled through the grounds of Stoneleigh Park. The outing was thoroughly enjoyed by all, and reflected great credit upon those who were responsible for its arrangements.

LOCAL TELEPHONE SOCIETIES.

Birmingham.—The concluding staff lecture of the summer series took place on the last Thursday in August at the district office, when Mr. May was warmly thanked by the members of the staff for his trouble.

Portsmouth. At a general meeting of the staff under the presidency of Mr. Stirling, the district manager, it was resolved to form a telephone society. Meetings will be held monthly, and the committee hope, with the kind assistance of some of the Head Office officials, to be able to prepare a very interesting and instructive syllabus for the ensuing season, opening in October.

WHAT THE COMPANY IS DOING.

TEN exchanges were opened during the month of September, bringing the total number up to 1,258. They were Lydbrook, Gloucester district; Appleby, Cumberland district; Craigellachie, North of Scotland; Byfleet, Guildford; Newby Bridge, Cumberland; St. Asaph, Chester and North Wales; Wotton-under-Edge, Gloucester; Preston, Hants and Dorset; Battle, Sussex; and Hoyland, Sheffield.

The net increase of stations during August was 2,927, making a total of 392,311.

LONDON.—*Paddington.*—A start has been made with the installation of the new common battery exchange equipment for 5,500 lines.

Sydenham.—The work in connection with the extension of the switchboard by 440 lines is completed.

Private Branch Exchanges.—Agreements have been entered into with the following to fit private branch exchanges:—Holborn Viaduct Hotel, Holborn; Yeoman House, Haymarket; and Windsor Court Mansions, Moscow Road, Bayswater.

Advertising New Subscribers in the Public Press.—The Contract Department has arranged with the *Westminster Gazette* to publish every Monday on the back page of the *Westminster Gazette* a list of all new subscribers joined up to the London system during the week previous. This arrangement will continue with the *Westminster Gazette* for the next six months.

Wiring New Buildings.—Consent has been obtained from the proprietors to wire the following buildings:—Yorkshire Fire Office, Princes Street; Oxford Mansions, New Oxford Street, W.; Carlton House, Regent Street, W.; Corner of Piccadilly and Park Lane; and Roman Wall House, Jewry Street, Aldgate.

The "Engineering and Machinery Exhibition," Olympia.—This exhibition was opened on Sept. 15 and will close on Oct. 17. For the convenience of stall-holders the Company is supplying them with direct exchange lines to the Kensington Exchange.

BRISTOL.—The underground extension scheme has made rapid progress, the whole of the cable having been drawn in, with the exception of two or three sections where it is necessary to replace the existing cables with those of larger capacity. The whole of the cables to Stoke Bishop and Westbury sub-exchanges have been drawn in, also the cables for the subscribers connected to the sub-exchanges. About twenty new distributing points have been brought into use, with the result that many who have required the telephone for some time past and who were unable to obtain connection owing to lack of spares have been connected up. A large number of distributing points will also be brought into use during the present month. The building to accommodate the extension of the main frame has been completed, also the 500 additional multiples and answering jacks of the Bristol common battery board.

A switchboard of double the present capacity is being fitted at Stoke Bishop Exchange, and similar work will shortly be carried out at Kingswood and Portishead Exchanges.

EDINBURGH.—A private branch exchange has been brought into use in the establishment of Mr. Patrick Thomson, draper, North Bridge, Edinburgh. The service, which is the first of its kind in Scotland, consists of three junction lines and 24 extensions. Other private branch exchanges are in course of construction in the city.

LUTON.—To provide for increased traffic 192½ miles of additional junction wire mileage is in course of construction.

BLACKBURN.—The underground extension scheme is now well in hand. Since January, 3,205 3-inch pipes, 1,461 three-way blocks, 70 six-way blocks, and 45 nine-way blocks have been laid.

MAIDENHEAD.—A large extension of the underground work in this town is at present being considered.

BRIGHTON.—The conversion of the Brighton switchboard to the common battery system is now complete.

LEEDS.—A start has been made with the installation of the equipment for 640 additional party lines.

GLASGOW.—*Langside.*—Exchange equipment for 380 lines has been put on order, and the installing is due to commence in this month.

Pollockshields.—Exchange equipment for 340 lines has been put on order, and the installing is due to commence in November.

BIRMINGHAM.—The delivery of the switchboard and racks has now been completed, and a start has been made with the installation.

ABERDEEN.—A site has been purchased for the construction of a new common battery exchange with a capacity for 7,600 subscribers' lines.

The following lengths of duct and cable have been laid:—

1	mile of duct and cable	at	Birmingham.
1¼	miles „ cable ...	„	Dudley Hill.
1	mile „ „ ...	„	Worthing.
1	mile „ „ ...	„	Leeds.
1	mile „ duct and cable	„	Hamilton.
2	miles „ duct ...	„	Bulwell and Beeston, Nottingham.
4	miles „ cable ...	„	Withington.
2	miles „ „ ...	„	Stockton.
1½	miles „ „ ...	„	Evesham.
1½	miles „ „ ...	„	Govan.
3	miles „ „ ...	„	Bristol.

The laying of cable has been commenced at Bridgeton, Glasgow.

THE

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TELEPHONE MEN.

VI.—CHARLES BUTLER CLAY.

CHARLES BUTLER CLAY was born in Liverpool in 1856. He was educated at a private school and at Malvern College. After leaving school he entered his father's Ironworks at Birkenhead in 1874, where he served the first three years of his apprenticeship, the last two being spent at Messrs. Laird Bros., Shipbuilding and Engineering Works at Birkenhead.

In 1879 he entered the Drawing Office of the Inman Steamship Company and subsequently sailed as an engineer in the old Atlantic liner *City of New York*. He was engaged on the drawings for the construction of the *City of Rome*, which was designed to be the largest and most powerful ship of her time.

In 1881 Mr. CLAY went to the Barrow Shipbuilding Company, the builders of the *City of Rome*, where he remained about six months. In the same year he was appointed by the late Mr. J. B. MORGAN to a position in the Instrument Department of the United Telephone Company in London. After a few months he became Chief of the Department, which position he retained until 1885.

At this time the Company had in London about 1,200 lines served by thirteen exchanges. In those days there was active competition between the United and the Globe Telephone Company, which at times became very acute; on one occasion the Globe Company tied a span of the United Company's wires together at a point near the Wool Exchange. Legal proceedings were taken against the Globe Company and it was found that the latter were taking photographs for the purpose of evidence. It occurred to Mr. CLAY that evidence of this nature would be most misleading, as it was quite possible to show the wires in contact or not, according to the point of view from which the photographs were taken. He therefore proposed that a model of all the roofs surrounding the Wool Exchange should be made and obtained authority to undertake the work in conjunction with an architect. After two days, however, the architect gave up the job. Scrambling over roofs to obtain measurements was too much for him, so Mr. CLAY with Mr. HAWES and Mr. ASHMORE continued the work, and Mr. CLAY and Mr. HAWES subsequently appeared at the Guildhall to explain the model to the Court.

In 1883 the great trial which decided the fate of the telephone patents took place in the Court of Appeal and lasted nine days. A considerable amount of apparatus was fitted up in a room behind the bench, and the experiments were placed in Mr. CLAY's charge. Almost every day of the trial fresh models of instruments were called for, and these always had to be produced at the next sitting of the Court. On one occasion, after consultation with experts at 2·30 p.m. on a Saturday, Mr. CLAY was called upon to produce a special instrument in time for the sitting of the Court on Monday morning. At that time the instrument staff numbered only two mechanics; and as luck would have it both were incapacitated. Efforts were made to get a man from Elliott Bros., but without success, and Mr. CLAY and Mr. HAWES decided to make the instrument themselves. They worked almost continuously through Sunday and Sunday night, and produced the instrument which was used for the demonstration which actually won the patent case for the United Company.

Later on Mr. CLAY was appointed with Mr. FLETCHER to take over the Globe apparatus when that Company was absorbed by the United Telephone Company.

It is interesting to note that during this period Mr. HAWES produced his multiple board, which was the first fitted in England, and was equipped at the Chancery Lane Exchange. Unfortunately, he was a very little late in securing a patent, as the Western Electric Company were before him, although, of course, Mr. HAWES had no knowledge of the work done by the Western Electric Company along the same lines. The board was a flat board, for the purpose of having operators on each side, and was known generally as the "Hawes Trough."

In 1885 Mr. CLAY went to the Northern District Company as Manager, and about a year later the office of Secretary was added to his duties. It is believed that Mr. CLAY was the first official in the Company's service to recognise the necessity for metallic circuits, and this principle was adopted in all the exchanges built in the northern district, with the exception of Sunderland which was equipped for some 280 lines before his appointment.

In this district the Post Office made their greatest struggle for the telephone business, and when Mr. CLAY went there they had about 500 subscribers in Newcastle.

They had also exchanges in Sunderland, South Shields, North Shields, Tyne Dock, Hartlepool, Stockton and Middlesborough. The Company had no exchange at the three latter places. They at once started the building of trunk lines and set up exchanges in these places, where Mr. CLAY had the assistance of Mr. PRESTON, Mr. DALZELL and Mr. BAILEY. The Company opened exchanges at Darlington, Bishop Auckland, Durham, Gateshead, etc., and soon obtained the majority of subscribers in all towns in the district. On one occasion a new exchange was equipped and opened for service within six days of receiving the order to extend the service to the town in question. This work involved, besides setting up the exchange equipment and running subscribers' lines, building five miles of pole line for junctions. Mr. CLAY was at that time rather proud of the fact that in October, 1889, Mr. LOCKWOOD, of the American Bell Telephone Company, in a paper before the American Institute of Electrical Engineers, said: "The best working long lines I found were without doubt those belonging to the Northern District Telephone Company. This Company is in charge of Mr. C. B. CLAY, of Sunderland. The lines are all new and are built on the latest model."

In 1888 Mr. CLAY made a short trip to America, where he had an opportunity of studying the latest developments in telephony, and he was the first to adopt the 8-wire arm as standard practice.

After the Northern District Telephone Company was taken over by the National Mr. CLAY remained in charge of the district until 1893, when he was appointed Superintendent of what is now the northern province. Before taking up these duties, however, he was offered and accepted a similar position in the south. The southern province then included the large area now known as the western province. Mr. CLAY was transferred to London as Metropolitan Superintendent in 1896.

In this position he has had the unfortunate experience of four serious fires. In 1902 the newly built London Wall Exchange was completely burnt out; the cause of the fire is unknown to this day. The work of re-instatement was put in Mr. CLAY'S hands, and a temporary exchange with 2,543 lines and 590 junction wires was in working order in the adjoining building sixteen days after the fire; the whole of the subscribers were re-connected within 21 days. The London Wall Exchange was rebuilt and the new equipment was nearly completed at the end of January, 1905, although it was considered that a month's work in testing out, etc., would be necessary before it was safe to open it. The second fire, however, which burnt out the temporary testroom, hurried things up a little. The fire occurred at 6.30 in the evening of Jan. 27, after most of the staff had gone home, but the new exchange was opened the following morning at 9.40. This result was due to the splendid work of the Metropolitan staff with the assistance of the Head Office Engineering staff.

Last month Mr. CLAY completed 25 years in the Company's service. At the present time he is at the head of a staff numbering 4,122 persons, and the Metropolitan system contains about 88,000 telephones.

Mr. CLAY has always been a keen volunteer and in 1874 joined the 8th Lancashire Volunteers, a corps raised by his father in 1859. He passed through the various ranks from Sub-Lieutenant and resigned in 1879 with permission to retain the rank of Lieutenant-Colonel and to wear the uniform of the corps on his retirement. He received the volunteer decoration in 1894. He was well known at the National Artillery meetings at Shoeburyness and won the officers' competition three consecutive years. He held most of the staff appointments and on several occasions was appointed by the War Office "Telephone Officer." This was the first time the telephone had ever been used for practice reports and Mr. CLAY laid lines not only for the Volunteer Artillery, but for the Royal Artillery competitions as well.

Mr. CLAY is a member of the Institutions of Electrical and Mechanical Engineers and is still a member of the Council of the National Artillery Association.

Portraits.—Orders can now be received for reproductions in plate form of the portraits of Mr. SINCLAIR, Mr. SANDS and Mr. CLAY.

PRESENTATION TO MR. CLAY.

A concert, held at Caxton Hall, Westminster, in aid of the National Telephone Benevolent Society was made the occasion of an interesting ceremony. In the October of this year Mr. C. B. CLAY completed his twenty-fifth year in the telephone service and it was felt generally that so important an event should not be allowed to pass by uncommemorated. The hall was well filled, amongst those present being Mr. BAILEY, Mr. HARVEY LOWE, Mr. DAVIS, Mr. ELLIOTT, of the Metropolitan staff, Mr. GILL (Engineer-in-Chief), Mr. PHILLIPS, Mr. COOK, Mr. FLETCHER, Mr. FRANCE, Mr. GALL, Mr. STUART, and others of the Head Office Staff, and Sir SYDNEY HOARE, Bart. Halfway through an excellent concert the presentation of a billiard table and an illuminated address was made to Mr. CLAY. The latter, which was beautifully executed, was the work of Miss MINTER. Mr. LOWE expressed the good wishes of the staff to Mr. CLAY, and pointed out that as the Company increased in size so Mr. CLAY'S personal success had increased. Mr. DAVIS alluded to the kindness and consideration with which Mr. CLAY treated all those who were under him, and gave statistics of the increase of the Company in London during his period of management. In replying, Mr. CLAY, who had a great reception, dwelt with some pride upon the success which had been achieved by the men who worked under him in the old Northern District Company, most of whom were now holding offices of importance in the Company and elsewhere. He was equally proud, he said, of his Metropolitan staff, and had no doubt that they would achieve similar success. There was further enthusiasm at the close of this speech, all present joining in the singing of "For he's a jolly good fellow." At the concert, which was under the direction of Mr. George Robins, the following artists contributed largely to the enjoyment of the evening:—Miss Rosa Dallow, Miss Nina Lorenzo; and Messrs. Arthur Strugnell, Wilson James, John Warren, Geo. Robins, Fred Chester, Walter Montagu, and Harry Frakiss. The presentation was chiefly subscribed for by the Metropolitan staff and by those members of the staff in other parts of the country who have been under Mr. CLAY in the past.

THE following interesting item of telephone news is culled from a recent issue of the *Electrical World*, New York:—

"PROF. A. M. MOREHOUSE.—Special advices from Ann Arbor, Mich., state that Prof. A. M. Morehouse, of the Department of Electrical Engineering, is going to London in the interest of the Western Electric Company, of Chicago. He is to study the telephone industry in Great Britain and report on it. He also is to act as the Chicago company's official adviser to the British Post Office bureau. The firm plans to instal its Pupin loading coils in the offices."

THE TELEPHONE IN AMERICAN POLITICS.

IT is time for someone to write a book, or at least an article, on "The Telephone in Politics," says the *New York Evening Post*. The telephone alone has made it possible for one man to manage a campaign over an entire city. It has curtailed the functions and responsibilities of a district manager (meaning a political district manager) as the cable has those of an ambassador. It enables a canvass to be made or a list of distinguished signatures secured for some "call" or manifesto, without the expenditure of several days' time or the employment of a large corps of workers. In Mr. Jerome's campaign last year one of the first steps was the installation of telephone instruments by which every district in the county could be reached instantly from headquarters. In the Philadelphia campaign, likewise, the victors bore testimony to the value of this device for correlating and saving effort.

OPERATING.*

BY G. F. STAITE.

THE title "Operating" is a very comprehensive one, and, of course, the whole question is quite beyond the scope of one paper. I propose to deal with only one detail, namely, the arrangement of duties and positions. This may appear on the face of it to be a somewhat simple matter and not of very great interest.

When I state, however, that the ideal arrangement has not yet been arrived at, that a great improvement on any present known system is possible, and that the arrangement of duties and positions is one of the most important factors in the giving of a smart service, it may give you some idea of the wide scope of the subject, and the interest which it really contains.

It involves an accurate knowlege of the following main points:—

(1) The actual traffic.
(2) The value of the traffic.
(3) Work capacity of staff.
(4) Distribution of load.

Before proceeding to discuss these it will be as well to examine the broad rules laid down by Head Office with regard to the service and the capacity of an operator.

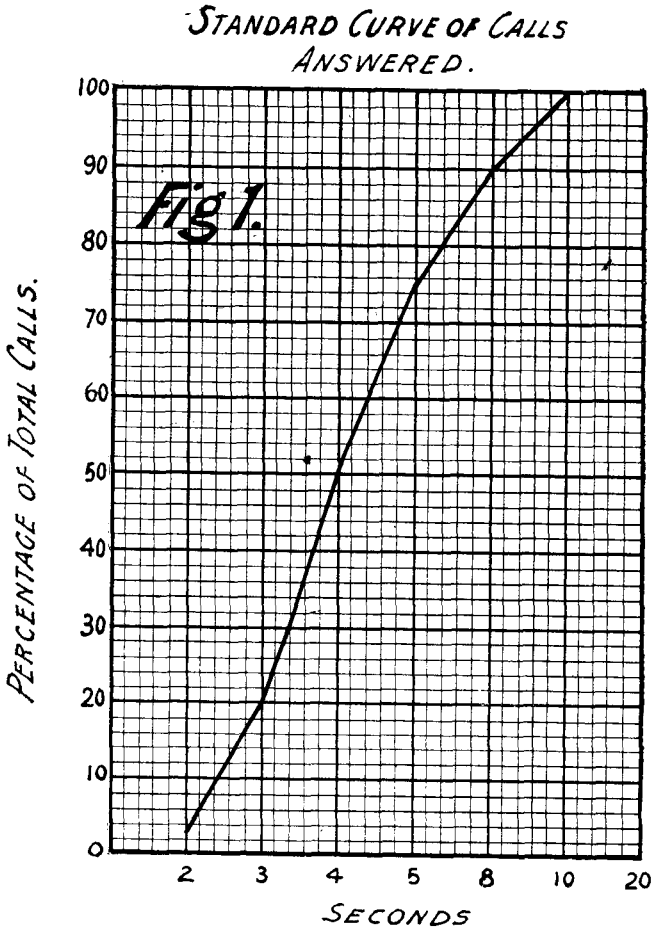


Fig. I shows Head Office standard curve of calls answered. This is supposed to be attained by every exchange on the Company's system. For some reason the clearing after conversation is not standardised in the same way, but we can take it for granted that the same standard applies. The average attention according to such a curve would be 5·72 seconds.

The Head Office standard of capacity for operators is 100 calls per half-hour, counting one junction call as two local calls. In addition, they allow certain excess to cover absence on holiday, or owing to sickness, and to make allowance for learners, etc.

These, then, are two important objects we have to keep in view: (1) To arrange the hours of duty so as to conform to the 100 calls per half-hour standard, and (2) to distribute the operators and load so that at all times each operator shall be in the best possible position to handle her own subscribers and to help her neighbours, and to keep within the attention standard.

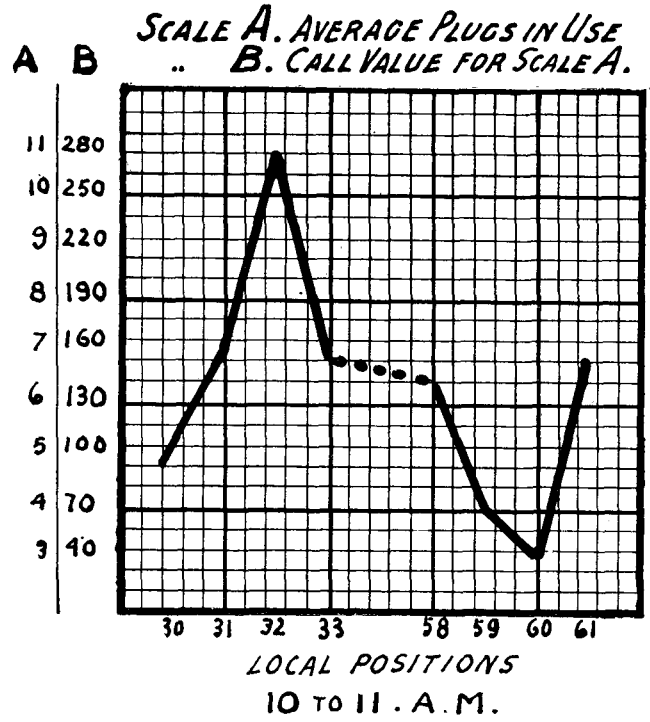
The question as to whether these standards are correct is open to discussion. If the second be too high the first cannot be attained. For the purposes of this paper we will assume they are correct. But I do not wish to convey the idea that Head Office valuation is correct. I will show, later, evidence that it is not so.

* Paper read before the Manchester Telephone Society, Session 1905-6.

I will now proceed to discuss in their order the four main points previously mentioned.

(1) *The Actual Traffic.*—This is supposed to be obtained from the usual quarterly record, prepared for statistical and other purposes, the results of which are published in book form and sent to the various districts. This record is taken on one day and is necessarily left very much in the hands of the operators. Now this does not give sufficiently accurate results for our purpose, for while it may be fairly correct in the aggregate, in detail it will be found to vary very considerably from the real facts of the case. There are many ways of getting at the truth. In Belfast, an exchange with about 40 positions, I recorded each individual subscriber's calls for one complete day (8 a.m. till 8 p.m.) by means of two specially engaged recorders, checked by selected operators. The operators recorded in half-hours while the recorders made one continuous record for the twelve hours. The operators' records were 3·6 per cent. less than the recorders. The recorders were coached for six weeks previously to taking the actual record, and their results were taken as accurate. Such a record for Manchester would take too long and I have taken a shorter method which I will try to explain. It is based on the average number of plugs in use for any stated period and the average duration of the subscriber's calls. Now to get the latter figure accurately would require some thousands of stop-watch observations, and this again would take more time than I have at my disposal, so I have fallen back on a double record expedient. First of all a count was taken of the plugs in use on each position every five minutes during one day by independent recorders, and from these an average figure representing the number of cords in use for each hour for each position was obtained. It doesn't really matter at present what value in calls this represents, so long as it gives a comparative value for each position (Fig. II). You will see by the figure that the values range from 2·9 to 10·6 in the hours 10 to 11 a.m. I have only shown a few positions on the figure—a busy group and a fairly quiet group—but each containing the highest and lowest value for the exchange respectively.

FIG. II.



The next step was to get an actual value for these comparative values, so as to show which positions were too heavily loaded and which were too lightly loaded. This was done by taking eight positions and recording each subscriber's line by a special recorder (the operators keeping a peg count in half-hours), and a plug count being taken at the same time each five minutes as before. In this way we get a sample of the exchange whose actual call value we know and whose plug value we also know. We can now draw a curve (Fig. III) which will give a call value for any particular plug value. In recording the "samples" the operators' peg record is only used for checking purposes No comparison takes place between the various counters. This is most important. Having found a call value, we can now set up a second scale in Fig. II (scale "B"), and we immediately get the call value for each position in the exchange.

These results do not come out quite regular, but by tabulating all the results the correct figures will be approximately arrived at. You will see later, when we are discussing the distribution, that with good team working a variation of, say, 10 per cent. to 15 per cent. in individual positions doesn't matter. In the present case 64 position-hours were tabulated, and the general figures approximated to the curve shown on Fig. III.

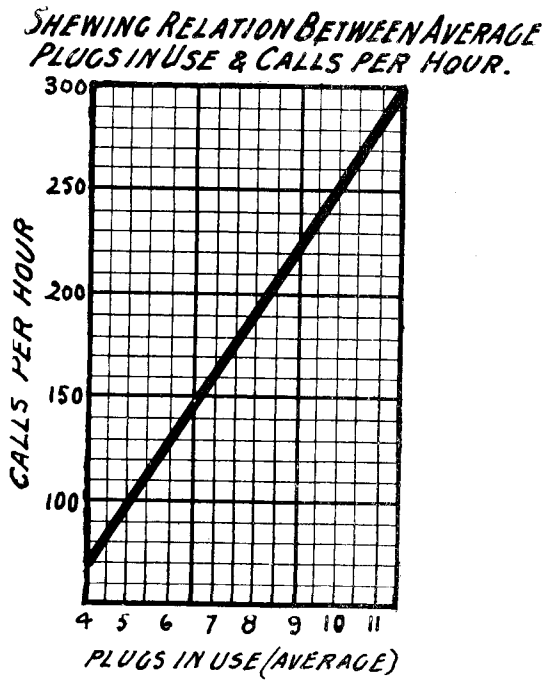
We can now apply the scale "B" (Fig. II) to the whole exchange, and so get a fairly accurate knowledge of the daily load.

(2) *The Value of the Load* depends upon the time required to make connection from one subscriber to another. The Head Office valuation, before referred to,

is not any real help. They allow one call for any local connection and two for any junction. This is over value for some exchanges and under value for others.

If it be allowed that the call from an unlimited rate subscriber to any subscriber who can be called from the multiple without bringing into use any special apparatus is the call which takes the least labour and time, that call may be taken as a standard and can be represented by unity.

FIG. III.



From the standard comparisons can be made to determine the value of every other sort of call which passes through the exchange. The valuation of the load depends then on purely local circumstances.

To make this clear I have prepared a table showing the different circumstances which affect the values at Manchester, Belfast, and a central battery exchange (see Table I). The information re central battery exchange is

TABLE I.

		Manchester (ring through).			Belfast (self-restoring indicator).			Central Battery Exchange.		
		Service.	Value.	% of total calls.	Service.	Value.	% of total calls.	Service.	Value.	% of total calls.
Destination of call		Flat, party lines, outgoing junction to Post Office ..	1	99	Flat, message rate ..	1	86	Flat, message rate, party lines, Post Office	1	88
					Party line	2	10			
		Message rate	2	1	Outgoing junction to Post Office	3	4	Outgoing junction ..	2	12
Origin of call.	Value of 100 calls—									
	From flat rate ..	..	101		..	118		..	112	
	From party rate ..	All commuted rate	101		Message rate	206		Metered or commuted ..	112	
	From message rate	Record and auto box ..	202		Record and auto box ..	236		Metered ..	112	

second hand, so I cannot vouch for its accuracy, but it will serve as a goo illustration of the point under consideration.

On the face of it this would appear to show that 100 calls on a comm battery board are of greater value than on Manchester board. The explana

of this seeming anomaly is in the design. Each of these three exchanges is valued on its own standard, but the three standards would be of very different values, that of Manchester probably being the highest.

(3) *The Work Capacity of the Operator.* This, as before stated, is set down by Head Office at 100 calls per half-hour per operator (valued). Some few years ago it was set down as 90. Why it was changed I don't know. Improved apparatus and possibly the tendency of operators to over record may both have had something to do with it, the records showing that the 90 calls per half-hour was frequently considerably exceeded.

The standard is supposed to represent the average capacity; but taking in the whole operating staff, from the first senior girl to the last joined half-timer, I have not found the average to come up to this standard. Taking the two busiest half-hours in the morning on the day on which I took the plug count, the calls for the flat rate operators averaged 81 per operator per half-hour, or taking the operators' own figures for the last quarterly record the average was 88. The operators dealing with these calls were 24 seniors and 47 juniors, twenty of whom had under one year's service. To get a fair average figure for all operators it is necessary to take these new operators into consideration, and if we look for half the standard amount of work from them we are expecting probably quite as much as we shall actually get. To show what this means to the rest of the staff I have deducte l 50 calls per operator for these twenty operators. This gives for the efficient staff an average of 103 calls per half-hour. This is a more reasonable way of looking at it than lumping the whole staff together and fixing a standard average. Different staffs have different proportions of inefficient staff, and in some towns the class of employee is better than others. Here again we have local conditions creeping in.

Fig VI.

We will now assume that we have definitely decided the work capacity of the whole staff, and as I have been dwelling on Manchester, let us suppose that we have decided that the average work capacity of the Manchester efficient operators to be 100 calls per half-hour, and that we consider it safe to work up to that figure. We have now so to arrange the work that under all the varying conditions of the day each operator will be in a position to receive and properly handle her proper share of work.

(4) *Distribution of Load and Arrangement of Operators.* The first step is to find the total load per half-hour and plot the result on squared paper. Then, having done this, build up another curve on the same sheet, following as nearly as possible the first curve, using 100 calls as the unit in the first place and one operator as the unit for the second; the two curves are of somewhat different character, the calls curve, advancing or diminishing by $\frac{1}{100}$ths of units in a fairly even manner, is represented by a continuous line drawn from point to point, which points represent the aggregate calls for the particular half-hour in which they appear. The operator's curve, advancing or diminishing by whole units, is shown as a dotted line following the squares of the paper.

I said just now that the second curve should follow closely the first. This is theory. In practice it is not wise to follow too closely. Take the first half-hour on the curve (Fig. VI), you will notice a much larger proportion of staff on than would cover the 100 calls per operator. This is due to the difficulties under which they now work. Each operator has a number of positions to operate, she has to walk about from position to position instead of having everything at her finger-ends. The adverse conditions diminish as the load increases and each operator's area gets smaller and smaller, and you will notice that by full load time it has disappeared. After the peak is passed it is not wise to commence to draw off at once, because the operators are beginning to tire and team working would be interferred with to some extent. Usually no reduction is made until twelve o'clock. From twelve o'clock to three the dinners are arranged, and at three o'clock the full afternoon staff is on duty and an effort should be made to maintain this full staff until at least 5 p.m.

From this chart we get the number of operator hours required and thus the number of operators. Table II shows a good working basis for the arrangement

TABLE II

RANK.	POSITIONS.
CLERK-IN-CHARGE.	
SUPERVISORS	One for each 9 operators' positions.
RECORD OPERATORS ..	As required.
SENIOR OPERATORS ..	One for each junction, party line and message rate position. One for each section of three positions for local subscribers. Reliefs for holidays and sick absence as required.
JUNIOR OPERATORS ..	One for each remaining local position. Reliefs for holidays and sick absence as required.
LEARNERS..	About 5 per cent. or 6 per cent. of total staff.

of the staff. Head Office lay down the rule that all junction, party line, and message-rate positions shall be worked by seniors, and also that one out of each group of three local positions shall be a senior.

You will notice that there are more operators than positions.

The excess operators provide for holidays, absences for sickness, etc.

The final arrangement of the operators' times of duty and positions at the board calls for a considerable amount of ingenuity. At almost every point there are difficulties. Some of the main features are as follows:—

(1) The day of eight hours should be in two equal parts of four hours each. Anything over four hours is too long for an operator to sit at one time.

(2) Each operator must work the same number of hours.

(3) Each operator in each class must take each duty in turn.

(4) There must be a just proportion of seniors and juniors on duty at each half-hour.

(5) Certain positions are the right ones to work from at very slack times, and certain positions are the right ones to leave open at less busy times.

(6) Positions should not be changed when avoidable during a spell of duty.

TABLE IV.

DUTIES				POSITIONS.		
No	ON	OFF	ON OFF	A.M.	P.M.	
1	10 — 2		6 — 10	5 B.	12 B.	Senior
19	9 — 1		2 — 6	6 A	5 B	Good Junior
45	9 — 1		2 — 6	6 C.	6 A	less efficient Junior.

To discuss each of these items would take up too much time, so I will shortly explain a system at present working which fulfils all these conditions. First, however, I will try and show some of the general rules of procedure in filling the positions and the arrangement indicated will hold good for the busy hours of morning and afternoon. Select certain junior positions equal in number to the difference between the morning and afternoon staff and load these to half-load; let these positions be occupied in the morning by the later juniors ("B"), and in the afternoon let them be vacant, using the operators for these positions in the room which will be left vacant by other operators who work split duties, to provide for late duties. These positions should be selected with a view to spreading out the extra work as far as possible. Where there is one unbroken line make them equidistant. Manchester is a peculiar example. There are four separate lines of operators, giving eight end positions. Considering one line only, the proper place for the vacant position would be in the middle; but here we have to consider the two sides of the multiple, and to have two vacant positions opposite to each other would increase the drawbacks, so we place them a little out of the centre in each case and in opposite directions.

Next select the senior operators for the local positions, one for the centre position of each group of three. Put very good operators next to the half-load positions. Then put an efficient junior at each section, observing the same caution of selecting a very good one next to the half-load position as in the senior. This leaves one position at each section for the less efficient juniors.

Having arranged these take each group of three and weigh its merits. Some groups can be called good and some only fair; don't let the "only fair" groups be adjacent to each other.

The Belfast duty sheet which is one I am going to describe fulfils all the conditions previously mentioned, viz.—

(1) No operator works more than four hours at a stretch.
(2) Each operator works 45 hours per week.
(3) Each operator in each class takes each duty in turn.
(4) Seniors and juniors having separate duty lists there is always a just proportion of both on duty.
(5) The positions changing with the duties the same positions are opened and closed automatically each day at the same time.
(6) For the same reason the minimum number of changes takes place during the spells of duty, and these are automatic, and the same changes, which are the necessary ones, take place every day.

Table IV is a portion of the duty sheet. You will see by this that operator 1 does a split duty, and so is away during the afternoon. Her position being one that cannot be closed, the good junior from *6a* takes her place from two to six. *6a* also is a position which cannot be closed, so the less efficient junior from *6c* takes *6a*; *6c*, being a half-loaded position and suitable for leaving vacant in the afternoon, is closed.

There is just one other point I wish to mention, and that is design. End positions are things to be avoided on subscribers' sections; they are affected in the same way that a vacant position affects adjacent positions. This checks the speed of answer, and slow calls must be looked for and guarded against by careful distribution. It is estimated that an operator on end positions loses about 20 per cent. efficiency.

In an exchange of good design there would only be two end positions, the total loss in efficiency being only 40 per cent. of one operator's capacity.

Taking Manchester with 72 positions, this would only mean ·5 per cent. loss per position, not a serious matter. But with the present design there are eight end positions, which means 160 per cent. operators' capacity loss, or 2·2 per cent. per position.

EXAMPLE IS BETTER THAN PRECEPT.

IT has recently become a matter for special comment, says the Philadelphia *Telephone News*, that the district offices do not give very good evidence of thoroughly understanding the best practice of handling their own telephone business. Incoming messages are handled very slowly; it is easy to tell when ringing is started on a city message, and often one or two minutes are allowed to elapse before a call is answered. Then, again, if a district manager or clerk is called for in person and he happens to be busy at the telephone or counter, the party calling is often left to wait for several minutes without any explanation. Recently the plant department was told that the U. G. I. wanted to meet a plant representative at 3rd and Arch Streets the next day. Of course, the nature of the work to be done determined the man to be sent, but the district office could not tell this, nor the name of the person or department of the U. G. I. making the request. (*Mem.*—U. G. I. stands, at a guess, for the United Gas Improvement Company.) Result—over half an hour wasted in getting this information—half a dozen departments of the U. G. I. unnecessarily bothered. If we don't know how to manage our own telephone messages, subscribers are justified in thinking that we cannot give them much valuable information on the subject. A half-hour's instruction in some district offices would show good results.

In one of the district offices recently visited the telephone bell rang three times before anyone would take the trouble to answer the call. Three clerks were in the room at the time. Meanwhile the subscriber was probably saying: "This Bell service is rotten. The operators take their time about making connections. I will complain to the district manager." A complaint would be made and the district manager would report to the traffic manager: "Subscribers complain that they can't reach the district manager without long delay. Won't you try to improve the service for me?" The traffic manager makes an investigation, but he probably never thinks of looking in the district manager's own office for an explanation, the place where the whole trouble occurred. Why doesn't the district manager "take a look" himself?

There are perhaps one or two National district offices where the above remarks might be taken to heart and the suggestions given acted on.

THE RECONSTRUCTION OF THE HAMBURG TELEPHONE SYSTEM.

THE telephone system of the German Government in Hamburg is undergoing an extensive reconstruction, and the following interesting particulars have been obtained through the courtesy of Mr. E. FEYERABEND, engineer to the Imperial German Telegraph Administration, who is in charge of the scheme, and to whom we are much indebted for the illustrations and other information.

Hamburg, including Altona and suburbs, has an aggregate of about 1,000,000 inhabitants; the number of subscribers' lines is at present about 27,000. The reconstruction involves a new central exchange building to accommodate the lines serving the whole of Hamburg and suburbs, a territory with a radius of 5·6 miles (9 kilometres). The cables, generally speaking, will have copper weighing 16 lbs. per mile (0·8 millimetre diameter).

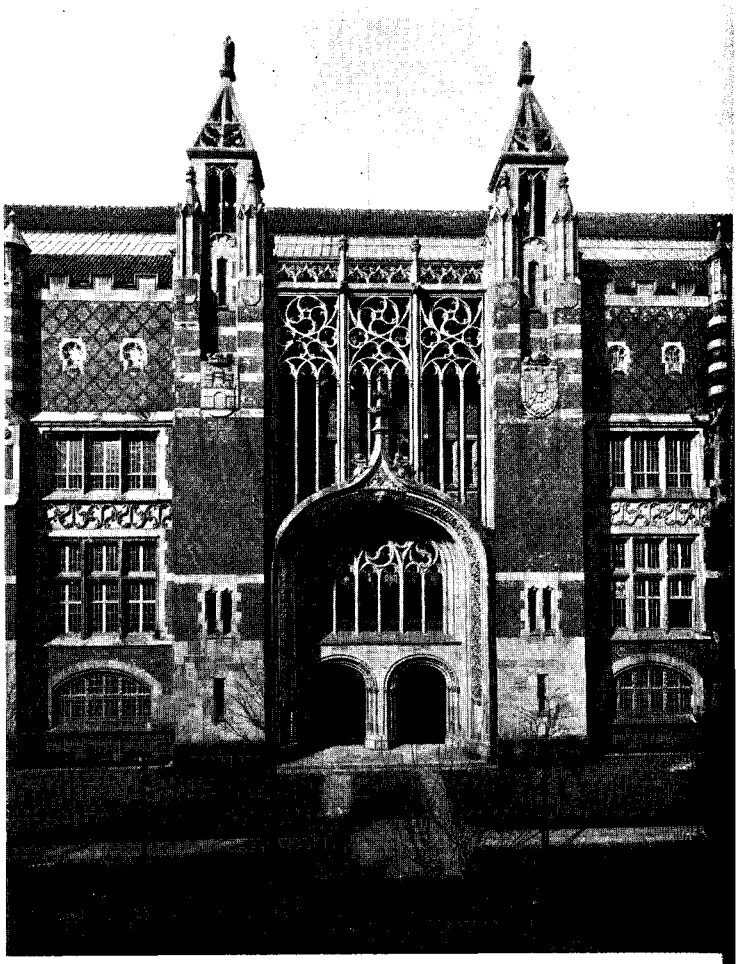
The new central office building, which has already been erected, is a most imposing structure, as shown in our illustrations, and is intended to accommodate an exchange with an ultimate capacity of 80,000 subscribers' lines. It will be by far the largest telephone exchange building in the world.

The switchroom will occupy the whole front of the top floor, and measures 439·6 feet by 65·6 feet (134 metres by 20 metres), with an arched ceiling the crown of which is 31·7 feet (9·66 metres) from the floor. Underneath this room and the same length, but only 8·2 feet high, is the department which will contain the distributing frames, relay racks, service registers, and frames on which the underground cables will terminate.

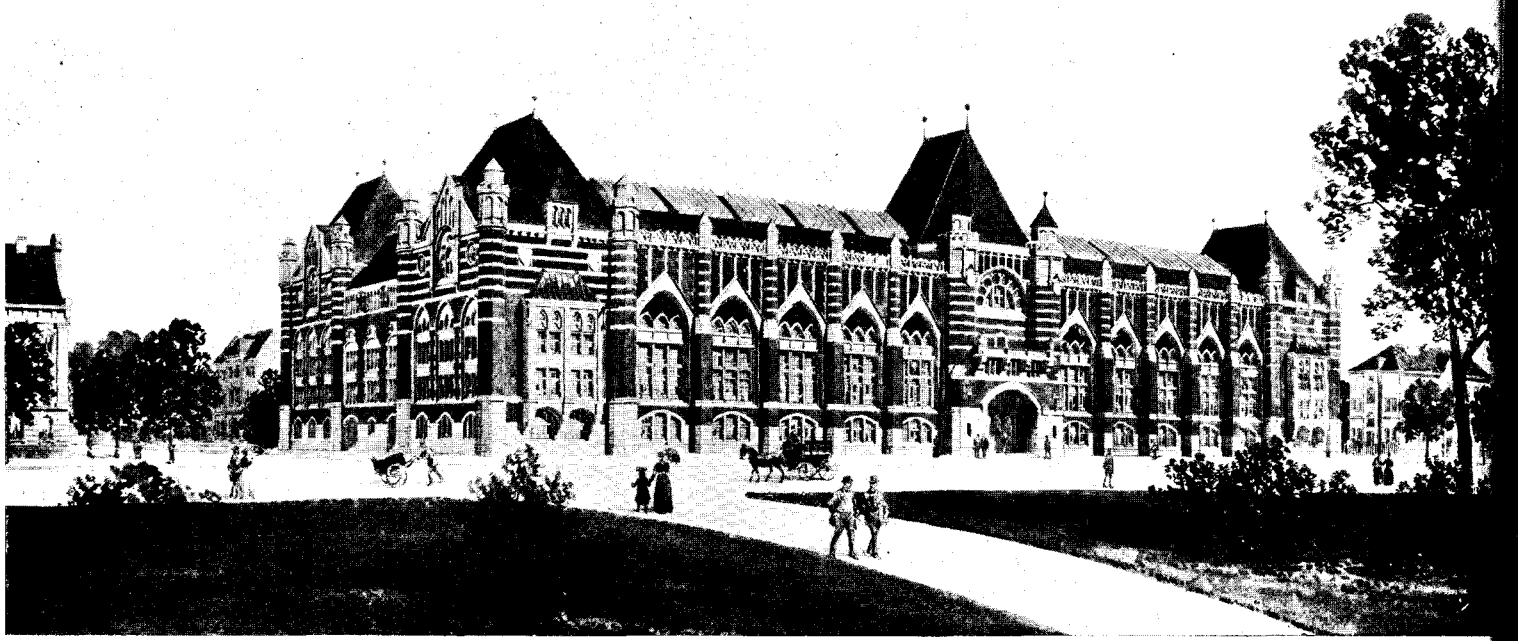
On the floor below will be two large long-distance exchanges, each for 500 lines. The side wings will contain the offices of the different departments of the administration, locker rooms, lunch and retiring rooms for the operators.

On the ground floor will be situated a telephone school, a post office, and large stores for all kinds of telephone line and instrument material.

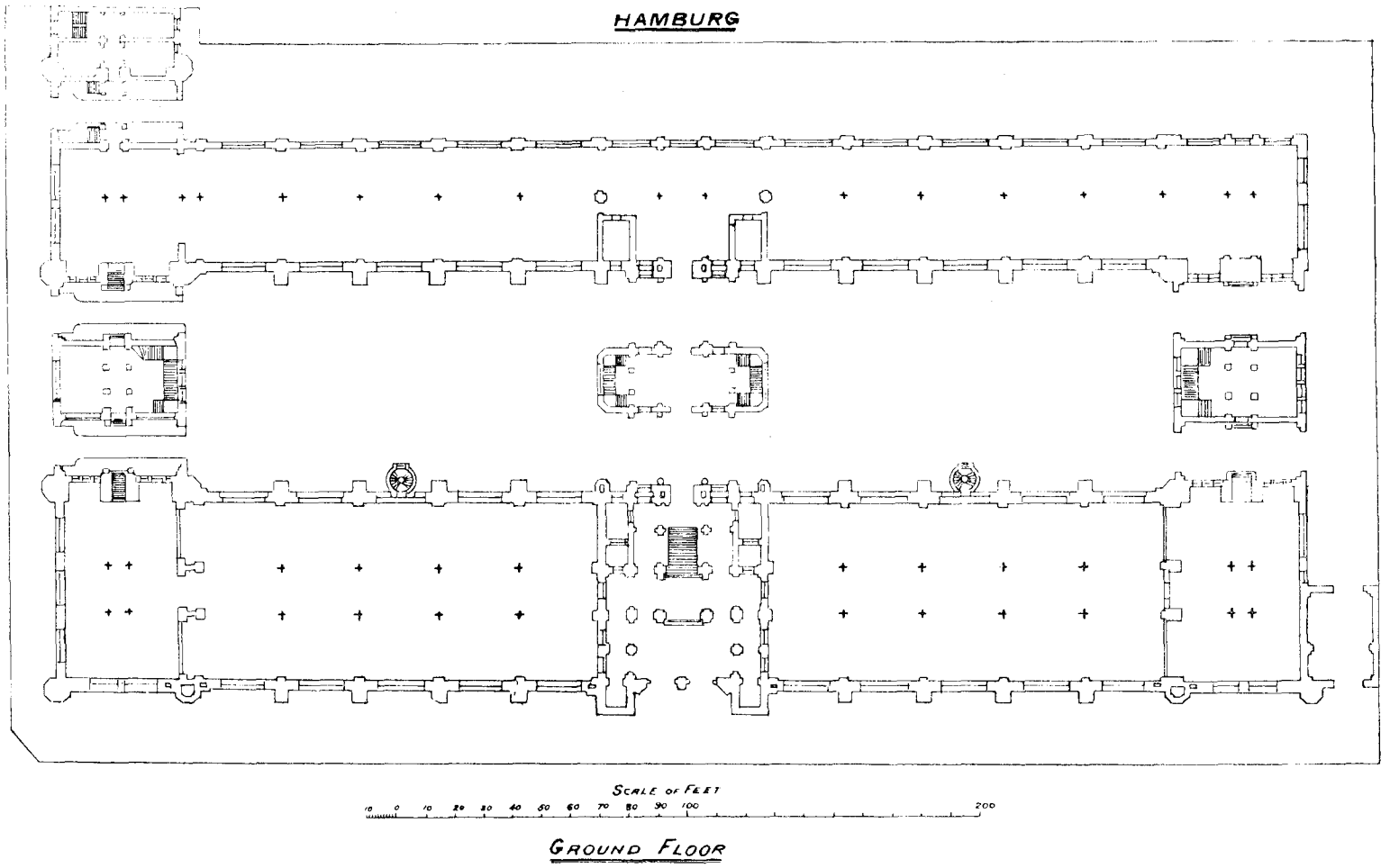
The basement will accommodate the plant for heating,



MAIN ENTRANCE.



ORIGINAL DRAWING FOR NEW TELEPHONE EXCHANGE FOR 80,000 SUBSCRIBERS AND 1,000 TOLL-LINES IN HAMBURG



GROUND FLOOR

ventilating and cooling the building, also the generating plant for the supply of current to the exchanges and for the lighting and power supply of the building.

The local exchange is to be equipped at first for 35,000 lines, but, as previously stated, can be extended to 80,000 lines. The ultimate equipment will be composed of eight groups of multiple boards, each dealing with 10,000 subscribers' lines, and the system adopted is what is known in this country as the call distributing system. The method of working will be as follows:—

A subscriber calling for, say, Central 2405, will operate a signal in front of a distributing operator "A." The "A" operator has direct single cord lines to each of another series of operators, which we will call "B," and these lines are furnished with signals on the "A" keyboard which indicate which "B" operators are engaged and which free. When, therefore, an "A" operator receives a call she is able to select a disengaged "B" operator, and she plugs the calling subscriber through to that particular "B" operator, thereby automatically lighting a signal before the "B" operator. The latter then takes up the call and answers the subscriber. To the "B" operator the subscriber states the section "Central" he wants, but not the number required; operator "B" selects in the same manner as "A" has previously done a disengaged operator "C," and plugs the calling line through to this operator, who in her turn takes up the call, and to whom the subscriber gives the number required, "2405"; operator "C" completes the connection at the multiple. The keyboard at the "C" positions is equipped with supervisory signals. When "C" takes down the connection an automatic disconnect signal is given to "B,' and similarly when "B" disconnects an automatic disconnect signal is given to "A," who completes the disconnection.

The service will be central battery throughout. It is expected that the first long-distance equipment will be brought into use next spring and the local exchange one year later.

A NOTE ON 20/10 LEADS FOR OUTSIDE POTHEADS.

By James Frost, *Engineering Inspector, Hanley.*

With regard to the present method of making potheads for outside work, it appears that some advantage might be gained by altering the method of preparation of the 20/10 vulcanised india-rubber leads. For the sizes of potheads most commonly employed (*i.e.*, 25 pairs and 50 pairs) the leads might be left with the portion that comes inside the pothead, which is filled up with insulating compound, unbraided, thereby saving the cost of stripping the braid off for the required length. This would also give more satisfactory results, as it is not always possible to strip the braid neatly. Of course this method of making pothead leads might increase the total cost of the pothead; and therefore would not be advantageous, but even supposing it to increase the price of the leads, there would, I think, be a gain, as the pothead would be more reliable. Then the question comes as to what lengths of lead would be most suitable for general use for each size of pothead.

For a 50-pr. pothead the leads might be supplied in two lengths, one portion of the 50 pairs to feed the top six arms and the other portion to feed the bottom four arms; 13 feet (including the unbraided portion) seems to be about the right length of lead for the top six arms and 17 feet (including the unbraided portion) for the bottom four arms. This allows for a maximum of ten arms on a 50-pr. distributing pole.

For a 25-pr. pothead a length of 13 feet (including the unbraided portion) would be sufficient, allowing for a maximum of six arms.

For anything larger than a 50-pr. pothead special leads could be cut, but these are not very often required. For smaller potheads than 25 pairs the leads for the latter size might be used, and where not convenient special lengths could be cut.

THE TELEPHONIC HUB OF LONDON.

THE Metropolitan offices of the National Telephone Company occupy a large amount of space in one of the palatial modern City office buildings, Salisbury House, London Wall. It seems quite in accordance with the fitness of things that the administration of the most wonderful invention of the age should occupy a site in a part of London whose history goes back to the times of Julius Cæsar.

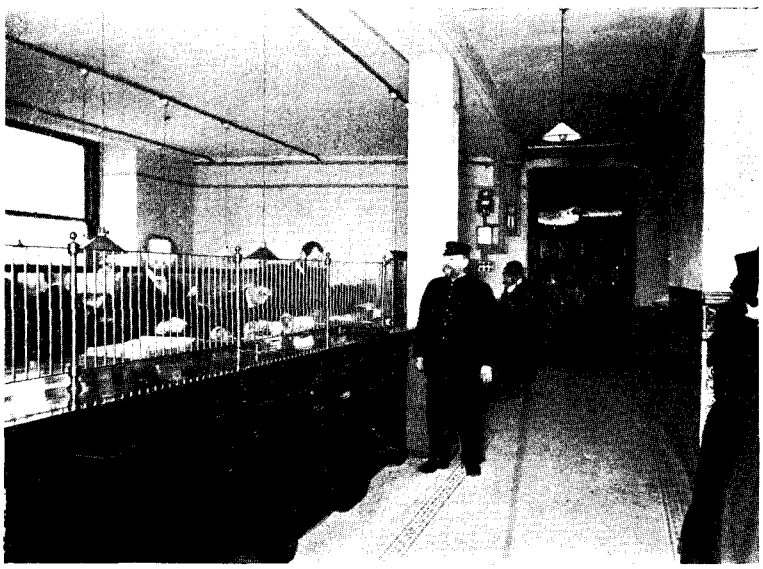


FIG. 1.—CASHIER'S DEPARTMENT.

From these offices is conducted the administration of the great London telephone system, with its 60 exchanges serving nearly 90,600 stations. Those who sometimes complain of the inadequate telephone facilities of London doubtless do not realise that the Metropolitan telephone area is by far the largest city telephone area in the world, covering over 640 square miles, a space in which Paris,

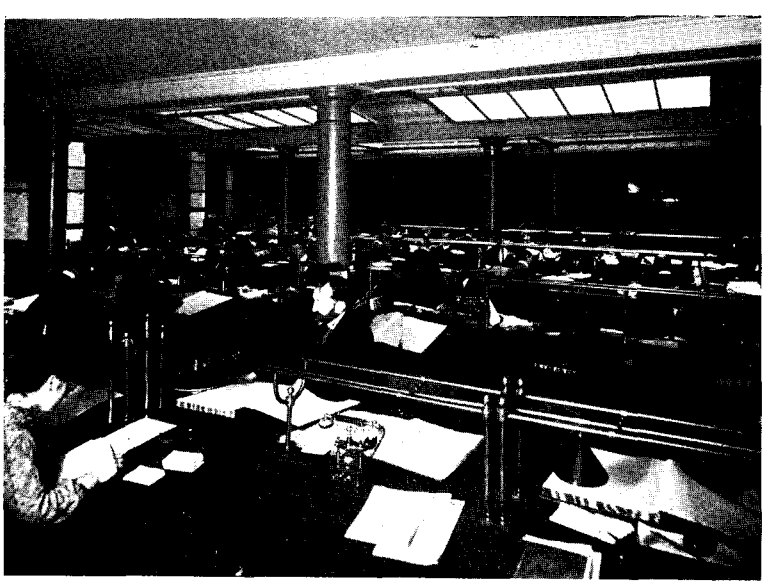


FIG. 2.—ACCOUNTANTS' OFFICE, RENTALS DEPARTMENT.

Berlin, Vienna, St. Petersburg, New York and Chicago could all be set out, with room to spare. The difficulties and the cost of building and maintaining a uniform telephone system at uniform rates in such a vast area, especially without proper facilities for building underground wires—facilities which have always been refused by the authorities though denied to no other electrical undertaking—are not in the least appreciated by the average telephone user.

Originally the administration of the London telephone system was divided among six district offices, there being a District Manager and separate staff for each division, the whole under a Metropolitan Superintendent. The results obtained under this system were not satisfactory to the General Manager and two years ago the administration was entirely re-organised, the district offices were abolished and the whole staff merged into a single organisation with central administrative offices at London Wall.

FIG. 3.—CITY INSTRUMENT STORES.

Mr. C. B. CLAY remained the head of the new organisation as he had been for a good number of years of the old. The posts of Assistant Superintendent, Chief Accountant, Metropolitan Engineer, Construction and Maintenance Electrician, Contract Manager, Service Superintendent and Stores Manager were created, most of these being filled at first by the district managers whose offices had

FIG. 4.—OUTER OFFICE, METROPOLITAN SUPERINTENDENT.

been abolished. Each branch of the work throughout London, accounting, engineering, maintenance, service, etc., was consolidated under its new chief and so a far more homogeneous and systematic arrangement of staff and duties was arrived at than was possible under the previous method of divided districts, which the conditions of the London system had long ago outgrown.

The change, which, as it involved a staff of some 1,700 people,

of whom a large proportion had been scattered among six departments situated in different parts of London, was no light matter, but as the whole scheme had been thoroughly planned beforehand the transfer of the staff and its distribution into the new organisation were effected without great difficulties. At the present time the number of employees in the Metropolitan offices is over 350, and among this large number there is not one that complains of lack of work. Indeed, the growth of the London telephone system is so rapid, and so much extra labour is involved by the reconstruction of plant which is continually in progress, that the Metropolitan staff has a constant tendency to expand and to overflow its accommodation.

The accompanying illustrations show a number of the principal offices of Metropolitan telephone headquarters. Fig. 1 is the Cashier's Department, which deals with the snug sum of about £750,000 a year. Considering how much the telephone service does to advance business and to add to domestic comfort, the public surely nowhere gets better value for its money than it does for that which is paid in over this counter.

Fig. 2 shows the Rental Department of the Accountant's Office. Here are kept the various rental registers and other numerous records dealing with the financial side of the telephone business. The total number of clerks employed in this department is 61.

Fig. 3 shows the City Division Instrument Stores. The line of men before the counter are fitters who, from the storekeepers behind, are receiving inanimate telephones which shortly they will convert to magic voice-bearing machines by attaching them to the great throbbing telephone system of London.

Figs. 4 and 5 respectively show the outer Office of the Metropolitan Superintendent and the Office of the Sales Manager of the Contract Department. Fig. 6 shows the Typewriting and Correspondence Department. As at Head Office, all correspondence is dictated by telephone to any typist who may be free, and there is a switchboard and complete telephone equipment for communicating to the twenty typists employed from any office in the building. Besides many pages of specifications, reports, etc., and tabulated statistical statements, over 1,000 letters a day are typed in this busy department. We could wish there were fewer, but the details of the telephone business are so many and varied, and the requirements of the telephone subscriber so frequent and exacting, that a vast volume of correspondence ceaselessly flows in and out of the offices of a telephone administration—much of it unprofitable, but little of it, alas! avoidable. The telephone service of the Metropolitan offices is provided by means of a private branch exchange connected to the London Wall Exchange by twenty junction lines and there are six direct lines to Head Office. The total number of

FIG. 5.—SALES BRANCH, CONTRACT DEPARTMENT.

FIG. 7.—LONDON WALL EXCHANGE.

FIG. 6.—CORRESPONDENCE DEPARTMENT.

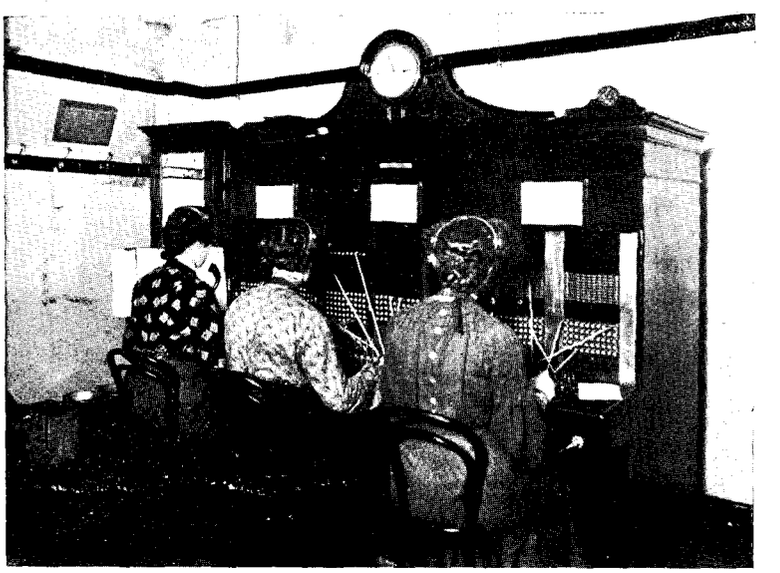


FIG. 8.—SAVOY HOTEL BRANCH EXCHANGE.

extension stations in the various offices served by the private branch exchange is 75, and the average daily traffic runs up to over 5,000 calls in and out.

Just across the street is the London Wall Exchange, one of the largest and busiest of the London exchanges, as it furnishes the telephone service for the half square mile which contains the world's financial centre. Owing to the exigencies of the building space available the equipment of this exchange had to be placed on three floors, or galleries, an arrangement which gives the interior of the building a very peculiar appearance. The lower gallery contains the incoming junction sections and the upper two the subscriber sections. The total capacity of the equipment is 10,000 lines. This exchange was opened for service on January 28, 1905, and its inauguration was the occasion of a notably smart piece of telephone work. The previous night a fire occurred in the testroom of the temporary exchange next door, which completely put the temporary exchange out of service. London Wall subscribers who read of the fire in their daily papers prepared themselves for an interruption of service, but when they came down to their offices they found the service working as usual, as the work of bringing the new exchange into operation was hastened so effectively that all the many thousands of subscribers' and junction lines were transferred to the new equipment practically in a single night. Although the new exchange was almost ready for service and was only waiting for certain testing and clearing up of details, it was a triumph of organisation and skill to complete the transfer of so many thousand lines in so short a time, amid all the confusion and havoc wrought by the fire—which even caused a certain amount of damage in the new building. Such a piece of work would have been beyond the capacity of any but a large and highly organised body of skilled workers.

An interesting picture, not strictly connected with the Metropolitan offices, although it illustrates work carried out by the Metropolitan staff, is Fig. 8, which shows the private branch switchboard of the Savoy Hotel, the first London hotel to be equipped with a private branch exchange. The switchboard is connected by sixteen junction lines to the Gerrard Street Exchange, and serves 247 extension stations in the visitors' rooms and in the various departments of the hotel. The equipment is common battery, with a power plant in the Savoy Buildings. The National Company supplies operators for day and night service, and patrons of the Savoy get a thoroughly up-to-date telephone service. Since the installation of this equipment the Metropolitan Contract Department has induced a number of London hotel proprietors to adopt private branch exchange service, and before long there will be few hotels in the Metropolis unprovided with a complete telephone equipment making the general telephone service available in every room.

THE CHEERFUL WORKER.

By T. J. CLARK, *Chief Clerk, Manchester.*

THE quality of cheerfulness has so direct a connection with the attainment of happiness and contentment during our mundane pilgrimage, and provides such an excellent antidote to most of life's little worries, that it is perhaps worth while considering what beneficial effects may attend the wider application of this pleasant characteristic—to things commercial as well as social.

Cheerfulness is essentially a practical virtue, and in the equipment of a successful man or woman brightness and cheerfulness will frequently be found factors of supreme importance. Just as good temper is said to oil the wheels of life, so is it a pleasant thing to deal with a business man who possesses the saving grace of cheerfulness. The exercise of this quality exerts a radiating influence which materially assists the amelioration of our human relations, and seems to illuminate both giver and receiver in that twofold sense so finely depicted by Shakespeare when speaking of the quality of mercy.

Now in the minds of many people "telephones" and "irritation" are terms more or less synonymous; it therefore naturally follows that in the telephone service there is a rich field wherein to cultivate and practice our chosen virtue.

For a long time past the qualifications governing the selection of operators have included special reference to the importance of possessing a pleasant inflection of voice, and since pleasantness and cheerfulness may be described as twin sisters, hardly distinguishable apart, it will, perhaps, be conceded that the subjects of telephones and cheerfulness are not so remote as might have seemed at the outset.

If, therefore, official recognition has already been bestowed upon the importance of promoting pleasant relations between the staff and the public, it must surely be admitted that at least equal importance should be attached to the necessity of establishing the bond of good fellowship among the members of the staff themselves.

It needs no laboured argument to prove that the best results can only be achieved in those cases where the different departments, together with the individual units forming each department, all work loyally and harmoniously together in the best sense of comradeship, recognising that they all unite to serve one common interest, and that the success of the final result must in some degree be shared by those who have conscientiously worked to secure the success.

We are all familiar with the copybook maxim "Union is strength," and have been warned from our early youth of the fate which awaits a house divided against itself.

Internal administration, to be thoroughly successful, must therefore rest on a foundation of good organisation combined with cordial staff relations, and, in regard to the last named, one of the highest essentials is the spirit of cheerfulness allied with efficiency.

Internal friction in departmental working must necessarily lead to diverted energy and consequent loss of efficiency, thus exhibiting the natural consequences attending the misuse or misdirection of our industrial forces. In such case the interests of the employer must inevitably suffer and the employees be similarly affected.

I therefore lay special stress upon the importance of cultivating the cheerful temperament. Under its gracious influence the phantoms of imaginary grievances cease to worry; life is far pleasanter and better worth living by not seeking to meet trouble halfway; while the way is still left open for the discussion of any real grievance, and with the promise of results more mutually acceptable by reason of a mental atmosphere of more kindly toleration all round.

It is, of course, to be remembered that the claims made for the desirability of promoting and cultivating the spirit of cheerfulness and pleasantness apply to all sections of the staff, to heads of staff and departmental chiefs as well as subordinates.

Like the gentle claims of courtesy, it extends to all alike, and I venture to predict that if the proportion of cheerful workers can be augmented both the individual and the community will benefit, while the combined results must irresistibly make for the cause of progress and efficiency.

NOTES ON OPERATING CALL OFFICES EQUIPPED WITH AUTOMATIC BOXES.

By E. B. COOPER, *Birmingham.*

SPECIAL attention is now being directed to the development of call office business. The Contract Department can do much in the way of selecting suitable positions for additional call offices, but the operator, being in constant touch with the existing users, is a most important factor in getting the greatest possible return from this branch of the service. In the light of special investigations made in the Midland province, I would draw attention to the following points:—

This branch of the service is now a source of considerable revenue to the Company, which is increasing every day. It is hardly necessary to emphasise the necessity for the best service it is possible to give. The call office user is generally a casual customer, he is often pressed for time, and the first experience in using a call office will have considerable bearing on his future use. It should be borne in mind that the call office customer is not usually an adept in using the telephone; indeed, it often occurs he

is using the telephone for the first time; under these circumstances the necessity for intelligent and helpful operating is obvious. If the number asked for from a call office is engaged, the operator should see to it that the call matures with as little delay as possible. On the other hand, the operator should see that if the caller exceeds the time limit of three minutes, with some little grace, a further penny be asked for. Of course there must be no doubt about the time limit having expired, but it is not unusual for call office users to occupy a line some ten or twenty minutes. In general it is the fairer sex who are the offenders, but so long as the caller is prepared to pay for the use of the line I see no reason why he or she should be disturbed, always bearing in mind the general interests of the service, *e.g.*, a long junction should not be unduly occupied in this manner.

For the reason that in many cases the load is not so heavy on message rate or call office positions, these positions are sometimes utilised as a medium for the training of operators. The fact that every operation is in reality a ready money transaction is too often lost sight of. This position should certainly be deputed to a competent operator, who will give a good and careful service and also give attention to the supervision necessary for obtaining the pennies or recording the calls if no automatic box is fitted. An objection to learners at these positions is that call office users as a class are exacting and imperious. A learner, naturally anxious to please, is soon embarrassed, and the result is an indifferent service which creates friction.

The automatic box is the bogey of the Company; every operator knows how much annoyance and controversy arise from the failure of the buzzer to record, but with efficient maintenance this trouble can be reduced to a minimum. Of course, the failure of the buzzer to record places the operator in a difficult position—the buzzer being her only guide so far as collecting money is concerned—so that every attention should be paid to the prompt clearing of these faults. To do this often involves special time, but the importance of the matter warrants this. Recent observations made in Birmingham indicated that there were only 1 per cent. of buzzer failures to calls—and there are good reasons for thinking that some of these were not actually buzzer failures.

An interesting comparison occurs between the person using an automatic delivery machine and the person using the automatic telephone box. In the first case, if the mechanism happens to be out of order and the article is not forthcoming, the user has no means of redress except to write to the Company. This is, as a rule, too much trouble, so the matter is allowed to drop. Not so in the case of the telephone. A target for complaint is at hand, the user naturally holds the operator responsible for the loss of his penny—ask the operator if, in general, he avails himself of the opportunity to protest!

I take it one of the two following methods of operating with automatic boxes is adopted throughout the country:—

(1) If the operator finds the called line free she forthwith demands the penny.

(2) The operator does not ask for the penny until she has actually obtained the called subscriber.

The service instructions are definite in stating that ineffective calls are not to be charged for on the message rate system. The instructions to the operator are that a message rate call must be considered as effective when the connection is completed, unless the calling subscriber calls her attention to the fact that the called subscriber has not answered. Just here is a source of trouble with automatic box call offices; the call office user who fails to get an answer after having put the penny in the box at the request of the operator will almost invariably draw the operator's attention to the fact, and the call must be considered as ineffective. Now under method No. 1 the operator has already made the charge, and to make amends promises to put the caller through free on the next occasion. In the majority of cases the caller is much annoyed, thinking, incorrectly of course, that the operator should be in a position to know whether or not the call would be effective before asking for the penny. Of course it may be argued, and it is argued, that the Company cannot be held responsible for people not answering the telephone, and that it has taken as much time and trouble to operate the call as if it had been effective. This is, I think, a short-sighted policy; it is of no use trying to explain to a caller the term "lost call," for he only thinks of "lost penny," or, as he often considers, "a penny obtained under false pretences." A caller treated in this manner is averse to the using of the call office on a future occasion.

I certainly agree that method No. 1 is the quicker, but it is not so satisfactory in other respects. Special supervision is, I think, essential in the operating of this class of service, and allowance must be made for this in apportioning the load. Method No. 1 is certainly too quick to allow the special supervision in the matter of collecting the fee. In some cases the operator asks for the penny and then finds out that the number wanted is engaged. I grant that this is faulty operating, but the method will in a way account for it. Then again, the penny is asked for and the called subscriber does not answer. In both cases the operator promises to put the caller through free on some future occasion. This is obviously a bad practice, the operator cannot tell for certain to whom she has made such a promise, and is not in a position to challenge any caller's assertion that the promise has been made to him.

Recent observations have shown that the public are alive to the inconsistencies of the operating, by reason of the fact that at some time or other, through careless operating, or on the strength of some previous ineffective call—real or alleged—having been charged for, the caller has been allowed to go through free of charge. There is no doubt that certain callers habitually endeavour to get through free of charge—it makes up, they say, for those occasions when a penny has been asked for and no result obtained—and it is done in some such way as follows:—

(1) Having at some time paid a penny and obtained no result, the caller very naturally delays putting in the penny. The operator is busy or expeditious and fails to supervise the buzzer signal.

(2) Operator reports the number wanted "engaged." When subscriber subsequently passes the call he will say

(*a*) "Can I have ..... now."

(*b*) "I have not got ..... yet."

Operator possibly think that she has previously asked for the penny, and puts the caller through.

(3) The caller asserts that he has put penny in the box and "did not get them." Of course this is unscrupulous, but the operator does not dispute—it is a possibility.

(4) The caller says he has put penny in previously with no result, and that the operator promised to put him through free of charge next time.

All things considered the only satisfactory method of operating call offices equipped with automatic boxes is method No. 2, for you at once eliminate the above contingencies. Every transaction is complete in itself. In every case when the signal to clear is given the operator is satisfied that the operation has been complete. What is more important still is that there is a minimum of friction with the users.

There is yet one more weakness of call office users which may be mentioned. It is that a user goes to a call office and without referring to the Directory gives in a number from memory. He very often finds out that his memory is faulty, and then blandly informs the operator that he has been put on to the wrong number—often there is no resemblance between the number asked for and the number he really wants. It is very seldom that the operator is equal to the occasion. Certainly the caller should be asked to pay for his mistake; not only because he has had a complete call, but also because he has unnecessarily called another subscriber to the telephone. The subscriber called in error often attributes this unnecessary trouble to careless operating, and the exchange manager has to take up the matter with the operator!

CITY AND GUILDS OF LONDON INSTITUTE.

A PARAGRAPH in the *Electrician* states that the 26th annual report of the Council of 1905 has been issued and contains a great deal of interesting information concerning the Technical Colleges in Exhibition Road and Finsbury. Amongst other matters it mentions that the Siemens' Memorial Medal for the student of greatest merit in electrical engineering was awarded to W. H Grinstead.

Mr. Grinstead is now a member of the Engineer-in-Chief's department at Head Office.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

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MESSAGE RATES.

IF from the very beginning of the telephone business it had been perceived that the message and not the telephone is the unit of the business, we should have been spared a great deal of aggravated controversy and a vast amount of more tangible and serious trouble. Just as the love of money is the root of all evil, so is the rate question the root of all telephonic troubles. The telephone business can never be developed to its full capacity, or even to the reasonable satisfaction of the public, unless it pays its way and yields a fair return on the capital invested. This is a simple truism, but the full force of it is not realised by the great majority of those who have dealt with the telephone problem without fully understanding it. The reason is that to develop the telephone service of any industrial country to its utmost capacity will need an amount of capital so vast that not even a Government will be able to provide if it is to be unremunerative.

The lesson is perfectly plain to read. In America, where the telephone service is run as an untrammelled commercial business and pays a good return on the investment, new capital is now being invested in telephone plant at the rate of over ten millions sterling a year. In Europe, where the telephone business is a Government monopoly and is operated generally at losing rates or at rates which furnish an insufficient margin of profit, capital is not forthcoming for the development, and universal dissatisfaction is caused by the relatively inferior service and the inadequate telephone facilities offered to the public. The reason is that a great business, requiring large and constant expenditure of capital, cannot be efficiently and actively developed, even by the nation, at unprofitable rates. Capital rebels against doing work for nothing just as obstinately as man does. That the telegraph service of almost every European country is worked at a loss is no answer, for a variety of reasons needless to specify, but for one because the telegraph business has long been practically stationary and the loss does not increase. There is no public demand for a wide increase of telegraphic facilities, but there is an insistent public demand—by reason of the vastly superior qualities of telephonic communication—for the increase of telephone facilities, and that demand will never slacken until every house, and every room of many houses, has its telephone. If this development is done at rates that will give a return on the capital the capital will be forthcoming, but if the rates are losing figures capital will no more flow into the telephone business than water will flow up hill.

Hence the vital and supreme importance of the rate question. That the flat rate system of charging was adopted at the beginning of the telephone business was perfectly natural, because it fitted the conditions. Like other things at the beginning, telephone exchange systems were small, and supplied service to a limited number of customers in a small area. The average use of the service by each subscriber was small, and the average amount of plant employed for each subscriber was small. Under such conditions the flat rate, or uniform annual subscription, was quite legitimate, and, applied to the same conditions, it is quite legitimate to-day. But in all large places the conditions have greatly changed. The number of telephone users has increased enormously, the amount of use made of the service has increased, and the telephone plant has spread over much greater areas. Consequently not only does the average subscriber demand more plant than he formerly demanded, but he makes greater daily use of it. The flat rate no longer fits the conditions; the uniform annual subscription either yields a loss on the service of the large users or must be fixed so high that the service is put beyond the reach of the small users and development is checked.

That the message, or effective communication, is the true unit of the telephone business does not admit of dispute. That the method of charging for telephone service in proportion to the use made of it may be "unpalatable" (as an Australian writer whom we quote in another column puts it) to those who have been accustomed to get a large amount of service for a disproportionately small payment is easily to be understood and equally regrettable. And it is an unfortunate feature of the situation that the very largest users, who have long had telephone service on unduly favourable terms, are possessed of the loudest voices and are so placed as to be able to raise the loudest protest against a correct and equitable tariff. But the fact that a message rate tariff will cause those who can best afford it to spend a little more than they now spend on their telephone service cannot in the long run prevent a great business from being worked on sound lines, on the only lines on which it can be satisfactorily developed for the greatest good of the greatest number.

THE NEW HAMBURG EXCHANGE.

WE print this month a short illustrated description, supplied through the courtesy of our distinguished *confrère* Mr. E. FEYERABEND, of the Engineering Department of the Imperial German Post Office, of the new telephone building at Hamburg and its proposed equipment. The whole scheme is truly imperial in its magnificent proportions and figures. The building is about 450 feet long, and will have a switchroom 440 feet by 66 feet, roughly the deck dimensions of a first-class battleship. The accommodation is

planned for an ultimate switchboard capacity to serve 1,000 long-distance lines and 80,000 subscribers' lines, the intention being to serve the whole telephone area of Hamburg and the vicinity from the one building. The proposed method of working the local service is what is known as the call distributing system. Three operators handle each call. A distributing operator, working at a board equipped only with line lamps and jacks and single-cord junctions, plugs the calling line through to a free answering operator; the answering operator takes the subscriber's request and plugs the line through to what corresponds to an incoming junction operator at the particular multiple division designated by the subscriber, and this third operator in turn answers the subscriber and then connects to the required number in the multiple.

Hamburg is the Liverpool of Germany, and has its Birkenhead in Altona, across the Elbe. The aggregate population is about a million, and the telephone area, with a radius of 9 kilometres, is almost exactly 100 square miles. It is naturally an area much broken up by water. To serve such a large and difficult area from one telephone building is a bold and novel scheme. While not withholding our admiration for the boldness of the telephonic experiment about to be undertaken at Hamburg, we venture to think that such an experiment is more likely to be made at the expense of an Imperial Administration than at that of a commercial concern. Imperial Administrations have unlimited resources, and have neither to earn money nor to pay dividends. The commercial company, if it is to live, must do both, and wants to know as accurately as possible where it is going before it embarks on a scheme of great cost which is opposed to all previous experience.

TRAFFIC ORGANISATION.

THE paper on "Operating," by Mr. G. F. STAITE, is well worthy of careful study by all members of the traffic branch. It is a thoughtful and studious paper, and shows the writer to be endowed with a spirit of investigation and a desire to apply the results of careful investigation in a thoroughly practical manner which are in the highest degree worthy of imitation. To ascertain accurately all the features of the conditions you have to cope with and then so to organise and manipulate your forces as to cope with these conditions in the most efficient manner is the very essence of good tactical organisation. This double process, as applied to the traffic of a large exchange, Mr. STAITE describes and illustrates very clearly, and the method and system which he brings to bear on the problem should give good results in quality of service and economical working even with an equipment which is not of the latest design.

On one point with which the paper deals—the value of the call—there will always be considerable difference of opinion, and Mr. STAITE'S comparative table (Table 1) does not greatly help to a clear understanding of the matter. The table deals with the work of three exchanges of different styles of equipment and different general characteristics and conditions. It is stated in the explanation of the table that "each of these three exchanges is valued on its own standard, but the three standards would be of very different values," and this statement obviously disposes of the usefulness of the table. The precise value in work of a telephone call necessarily cannot be determined, since there are so many varieties of calls and so many surrounding conditions which influence the amount of work any call will cause. The value of the call is influenced not only by the proportion of the various classes of calls to the total, by the proportion of junction traffic, by the proportion of effective and ineffective calls and by the shape of the load line, but also by the design of the equipment and the standard of maintenance observed, and by the efficiency of the operators and of the subscribers. That a wide variation in the value of the call exists is recognised, and indeed demonstrated in the paper, and it may be confidently expected that there will always be sufficient variation in local conditions to maintain a certain variation in the value of the call in different places, even when equipment and general methods are all absolutely uniform and of the highest attainable standard of efficiency. Under these circumstances a general measure of work can only be a general guide; it will be too low in many cases, while in some—where the complexity of the traffic is exceptional it may express a standard too high for the actual conditions. In the great majority of cases the present standard of 100 calls per half-hour, counting an outgoing junction call as two, is well within the capacity of the staff, given good traffic management and organisation. In a few, where a variety of difficult conditions may exist, the actual standard, expressed in calls per operator, may not be reached, while the real work done, measured in flat rate calls, may be greater. The lesson to be derived by traffic managers from Mr. STAITE'S useful paper and from these few remarks is the importance of studying the actual conditions of the traffic as closely as possible and of using the results obtained as a guide to the scientific disposal of the operating staff.

AUTOMATIC BOXES.

THE automatic telephone box is not the pleasantest feature of a difficult public service. If it were absolutely proof against the occasional lapses from regular working which occur to all mechanical devices, and if it were invariably used intelligently and honestly by the public, the automatic public telephone would be a most satisfactory arrangement. It can be placed almost anywhere, it is handy, convenient, and independent, and, with a higher code of automatic and public morality, it would be an ideal means of providing an important public convenience—a highly developed public telephone system. Unfortunately the automatic telephone station is beset by a variety of internal and external troubles. In common with any appliance available to the whole of the public it gets a good deal of rough usage; this is bad for electro-mechanical apparatus and inevitably causes irregularities of working, which often betray themselves at critical moments and cause friction in the working of a high-pressure service peculiarly susceptible to friction.

The occasional failure of the automatic box to notify the operator that a coin has been inserted gives rise to a double evil. First it causes a dispute between operator and caller, as the operator is reluctant to complete the call unless she gets the signal announcing that payment has been made; if the caller insists that payment *has* been made, the operator naturally has to give way and take his word for it. But a delay has occurred and a dispute, perhaps an acrimonious dispute, if the caller happen to be exceptionally impatient and, let us say, unpolished, has introduced friction into what ought to be a smooth and rapid operation. Then, as that intelligent and not very scrupulous section of the public which loves

to get something for nothing discovers that the telephone operator can be argued into putting a call through which she is not certain has been paid for, the practice arises of habitually endeavouring to get calls put through without payment. If the box is sometimes out of order, why not pretend always that it is out of order? That the desire to get service rendered without payment inspires a fair percentage of the general public is the common experience of all public service suppliers. The railway companies, for example, especially those dealing with short-distance journeys, employ an army of inspectors to cope with it. It is undoubtedly easier to bluff an invisible telephone operator than a railway servant present in the flesh and blood, and the two articles by Messrs. COOPER and FROST give some idea of the variety of pretext employed to keep the humble penny out of the automatic telephone box and in the pocket of the caller.

The automatic telephone is far too important a public convenience to be allowed to become the victim of lax and irregular practices. With proper care and maintenance and intelligent operating it is capable of giving an excellent service, and it provides a facility that is undoubtedly appreciated and cheerfully paid for by the large proportion of considerate and just telephone users. The observations noted by Messrs. COOPER and FROST will doubtless be of service to many, but some of these difficulties would disappear if the service instructions were more carefully observed and strictly adhered to. We hardly think that the practice of getting free use of call offices by deliberate misrepresentation is general or widespread, but it is a practice that may easily grow up in any locality, and in the interest of the service, and of the revenue, it should be checked as promptly as possible wherever its existence may be noted.

AMERICAN TELEPHONE DEVELOPMENT.

WE print this month some remarkable figures which illustrate the extraordinary development in the use of the telephone which is proceeding in the United States. These figures have been compiled by a leading American financial paper from the official returns of the American Telephone and Telegraph Company and, as the closing paragraph indicates, are intended to draw attention to the value of that company's shares, which are quoted on the New York Stock Exchange at about $138 per $100 share. As the dividend has just been raised from 7½ to 8 per cent. the shares at their present quotation certainly cannot be considered dear. It is perhaps not generally known in this country that the American Telephone and Telegraph Company is the parent concern of the great operating companies which work the Bell telephone systems in the various cities of the Union; it is also the owner of the long-distance system which binds those cities together telephonically. The parent company leases to the operating companies all the telephones which the latter use, so the American Telephone and Telegraph Company's "instrument statement" gives an exact indication of the number of telephones in use in all the Bell systems throughout the United States. Each receiver and each transmitter is counted as an "instrument" so that the total number of instruments must be divided by two to get the number of complete telephone sets. So we see that at the end of 1905 the Bell operating companies had, in round figures, 2,850,000 telephones in use, and at the end of this year will have the enormous number of 3,650,000 telephones in use.

At every point the figures illustrating the development of the American Bell telephone companies simply stagger the imagination. During the past six years the amount expended on construction has been over £42,000,000, and last year alone nearly £11,000,000—almost as much as the whole capital of the National Telephone Company—was spent on new telephone plant. From the end of 1900 to the end of 1903 the Bell telephone systems doubled in size, and from the end of 1903 to the end of 1906 they will have nearly doubled again—an increase of nearly 300 per cent. in six years. And this marvellous growth shows no signs of slackening, the increase each year is invariably greater than the increase of the preceding year.

Why should the Bell telephone systems of the United States add *in a single year* nearly twice as many telephones as there are in the whole of the United Kingdom? Is there something in the American climate which makes the Transatlantic telephone a necessity, while on British soil it remains something of a luxury? That would be a very feeble answer to a very big question. The superior telephone development of America is due, no doubt, partly to conditions of race and climate; everything which makes for rapidity and efficiency is adopted and developed more quickly in America than here. There are fewer prejudices, collective and individual, to break down and fewer conservative instincts and habits to overcome. But the broad reason for the high standing of the telephone business in America is that it has been from the beginning a purely commercial enterprise, subject to no restrictions other than those imposed on the ordinary trading concern. The American telephone companies do not work under limited licences, their life is practically unlimited, so that capital, even in the huge sums now required, comes forward readily for development. They do not pay a royalty of 10 per cent. on their gross receipts, so that their rates are not artificially inflated by a Government tax. Their operations are not limited to restricted areas and their business has not been dismembered by the absorption of the trunk lines.

The great development in the American telephone business has occurred during the past six or eight years, dating from the time when telephone construction and equipment became fairly efficient and standardised and the adoption of message rates became general. Within this period the efficiency of the service has become so high and so uniform, and the rates have been reduced to such a practical and equitable system that the use of the telephone has spread enormously—a telephone in every room of every house is now the legitimate ambition of the American telephone manager. In this country the uncertain political conditions which have rested over the telephone business have made it impossible to contemplate unrestricted development or to plan for it. Hence the development of the telephone in England will always be far behind the American performance.

FARADAY MEMORIAL.

LORD KELVIN has fixed Nov. 24 for the unveiling of the Faraday Memorial.

The tablet which is now being engraved will cost rather more than the amount which has been subscribed; if therefore any other member of the staff would like to have his or her name associated with this Memorial there is still time to send in a subscription (limited to one shilling) to Mr. GILL at Head Office.

THE TELEPHONE IN THE MINING DISTRICTS OF COLORADO.

THE Denver correspondent of the *Mining Journal* gives the following account of the use of the telephone service in the remote and scattered mining centres of Colorado:—

"The Colorado Telephone Company, with headquarters at Denver (the railroad, financial, commercial, manufacturing, and mining machinery and mine supply centre of the State), has 2,700 miles of pole line, 17,000 miles of copper wire 'toll lines' between the different cities and towns of the State, 50,000 telephones in use, and over 2,000 employees.

"This vast system includes practically all the mining towns and districts of Colorado, and in reaching some of them crosses the main range of the Rocky Mountains at Mosquito Pass (altitude, 13,700 feet) between Alma and Leadville, and at Argentine Pass (altitude, 13,100 feet) above Georgetown.

"Owing to the deep winter snows and the severity of winter storms, pole lines over these passes are out of the question, and underground cables are used, of which there are about two miles over Mosquito Pass and two and a half miles over Argentine Pass.

"Pole lines are used over Hunter's Pass (altitude, 11,500 feet) between Leadville and Aspen, Berthoud Pass (altitude, 11,350 feet), 65 miles west of Denver, while the pole line between Ouray and Telluride attains an altitude of 13,800 feet, and at one place has a span of 1,000 feet between poles.

"All the principal mining centres of the State, such as Alma, Aspen, Boulder, Breckenridge, Central City, Cripple Creek, Georgetown, Idaho Springs, Leadville, Ouray, Silverton, Telluride, and Victor have their local telephone exchanges, included in which are the individual telephones of the local assayers, electric power companies, mines, mining engineers, mining machinery and supply firms, ore buyers, ore treatment mills, provision merchants, railroad offices, sampling works, etc., in fact, all the people with whom a mine operator or manager has regular dealings.

"Dozens of less important mining localities throughout all the Colorado mining counties are also 'on the line,' and therefore in ready touch with all the business connections they need at any point in the State.

"Moreover, in every mining centre, large or small, there is a 'public pay station,' where, for a reasonable fee, graduated according to distance, one can talk with any other of the 50,000 telephones in the State.

"Take the ordinary Colorado mining town. The neighbouring mines are scattered among the mountains for a radius of several miles at least, usually at elevations of hundreds, if not thousands of feet above the town itself, which was built where there happened to be a sufficient extent of fairly level ground for the town site.

"Before the advent of the telephone, ordinary mining requirements involved frequent trips from the mines, by vehicle or saddle horse, to the neighbouring town, for one thing or another, occupying the time of manager or men, and to that extent increasing the annual operating expenses.

"The utilisation of the telephone has obviated the necessity for the great majority of such trips, and correspondingly reduced operating expenses, to say nothing of saving time previously lost, for instance, in waiting for some necessary article rendered necessary by temporary breakdown.

"The telephone operates in the same way in reducing the number of trips made by mining men from the mining towns to Denver. The value of this saving is emphasised by the distances by railroad of the various mining towns from Denver; and, owing to the elevation of the various mining districts, the railroad mileage by no means gives an adequate idea to a person living at sea level of the time involved in a railroad ride from Denver to one of the mining towns.

A YEAR'S FIRES IN BRADFORD.

THE Chief Officer of the Bradford Fire Brigade in his annual report shows that 131 calls were received as follows:—

Per National Telephone	61
Street fire alarms	57
Messengers	13
	131

TELEPHONE EXPANSION IN AMERICA.

No part of the electrical field to-day, says the New York *Electrical World*, is enjoying a more rapid development than telephony, and some remarkable statistics have been compiled bearing upon the expansion of the Bell Telephone interests in the hands of the American Telephone and Telegraph Company. The data compiled are quoted below.

Few people have any adequate conception of the construction requirements of the Bell companies. During the past six years they have expended for new construction and real estate no less than $219,547,906, divided by years as follows:—

1900	$31,619,100
1901	31,005,400
1902	37,336,500
1903	35,368,700
1904	33,436,700
1905	50,780,906

The fact is not generally appreciated that on the basis of last year's business the total daily average of Bell telephone connections throughout the United States was 13,911,000, or at the rate of about 4,479,500,000 per year, being 54 telephone calls for each man, woman, and child in the United States. Only six years ago the annual number of calls was 1,708,800,000, the increase to Jan. 1 last being 160 per cent. It is increases in business like this, almost staggering in their immensity, which the American telephone directors are called upon to finance. At the end of last year the Bell companies had in use no less than 320,000,000 lbs. of copper wire, worth on the present copper market $62,400,000.

The net output of instruments for the first eight months of this year was 960,520, although, much to the relief of the overworked construction department, the August statement in both gross and net output of instruments was the smallest of any month this year. The average output of the first six months of each of the past five years has been very close to 50 per cent. of the entire outputs of each of those years. On this basis it is conservative to estimate the total net output for 1906 at approximately double the figures for the first six months, or, say, 1,600,000 instruments.

The following table shows the instruments outstanding at the end of each of the past seven years, the figures for the current year being estimated:—

INSTRUMENTS.

Year.	Outstanding.	Increase.	Per cent. Increase.
1900	1,952,412	372,311	23·5
1901	2,525,606	573,194	29·3
1902	3,150,320	624,714	24·7
1903	3,779,517	629,197	19·9
1904	4,480,564	701,047	15·8
1905	5,698,258	1,217,694	27·1
1906 (estimated)	7,298,000	1,600,000	28·0

The instrument statement offers a basis upon which to figure earnings. The ratio of subscribers' stations to instruments is about 44 per cent. The gain in 1906 net earnings figure as follows:—

Gain in subscribers' stations	704,000
Increase in gross receipts at $45 per station...	$31,680,000
Increase in expenses, 74 per cent of gross ...	$23,443,200
Increase in net earnings	$8,236,800
American Telephone Company's share, 56 per cent.	$4,612,608

To the above gain of $4,612,608 must be added at least $1,500,000 to represent the increase in long-distance profits and the increase in rentals of instruments. A conservative estimate of the American Telephone Company's increased profits this year is, therefore, $6,000,000. If undivided equities are taken into consideration it is not difficult to figure an earning power of 13 per cent. on the outstanding stock of the parent company.

AUTOMATIC BOXES.

By FREDK. J. FROST, *Traffic Manager, Brighton.*

THIS is not an agreeable subject, as every telephone worker knows. Like all other telephonic apparatus, automatic boxes have changed greatly in working since their first introduction, but not, unfortunately, with the same satisfactory results.

In the earlier days of telephony the type of box most generally used was a large wooden affair, some eighteen inches or so square on the face and projecting about nine inches from the wall, fitted to the backboard of the instrument immediately below the transmitter, which at this time was a "Blake." There were two slots, one for pennies and one for sixpences. When the required coin was put in the proper slot it slipped down a chute to an opening where it struck a gong, turned a somersault, and then fell down another short chute into a cash box below, the signal to the operator being the striking of the gong, heard through the subscriber's transmitter.

At this time all subscribers were supplied with two keys, the insertion of either of which in a slot in the box provided for it caused the corresponding gong to be struck by a hammer, giving the operator the same signal as a coin would do; the keys thus formed a sort of free pass for subscribers at all call offices.

The method most frequently adopted by callers to avoid proper payment was to give one of the gongs of the magneto bell a sharp rap with a key, usually with satisfactory results to themselves, for what with vibration noises in the transmitter, induction on the lines, etc., the operator was not to be blamed for not recognising the difference in the gongs. The boxes in use at the present time are a great improvement on the old type, although still a long way from perfection. There are two patterns in general use, but the principle of both is the same, viz., the giving of an electrical signal over the line when the coin is inserted; this signal is heard only in operator's receiver in the case of combined wall instruments and automatic boxes, but with the small detached boxes now most generally in use the buzz is also heard in the caller's receiver.

The action of the box is as follows:—The coin is dropped in the slot and allowed to fall, and then, either by depressing a lever on the combination wall instrument or by the half turn of a crank on the detached box, as the case may be, the coin is mechanically passed through the apparatus and forcibly shot into the cash box.

Immediately the lever or crank attachment engages the coin a local circuit is closed through speaking battery of instrument, primary of induction coil and buzzer, the operator hearing the resulting buzz sent out to line.

In common battery systems current for working the buzzer is taken from the line, a 100-ohm resistance coil being usually included in the buzzer circuit to cut down the voltage.

Another type of automatic box is that used by the few corporations engaged in telephony; in these it is necessary to pay the fee first or you cannot call the exchange. This is a very unsatisfactory arrangement, for several reasons. If the line is out of order you lose your penny straight away. If the number you want is out of order, engaged, or does not reply, it has cost you a penny to find that out. Even to speak to the telephone officials themselves you must pay, and when a subscriber wishes to report his own telephone out of order from a call office he has to pay a penny for doing so. Turning to the use by the public of the call-office system, in Brighton recently a deliberate attempt to avoid payment of the small fee required for service duly rendered having come under my notice, it occurred to me that the Company must be losing a considerable sum of money annually in this way, so after watching matters closely for a few days I decided to make a determined effort to stop the trouble in this district.

I first gave instructions to the clerk-in-charge at each of the three town exchanges and to all the outlying exchanges that under no circumstances was anyone to be put through from an automatic box instrument (other than to service numbers) unless the operators got the proper signal, neither was any operator to argue with a caller or attempt any explanation. Every call for which a penny was not put in when asked for was to be dealt with by the clerk-in-charge of the particular exchange, or in special cases referred to me. The immediate result was startling. For about a week we could find time for little else than arguing with call-office users who had evidently been accustomed on one pretext or another to get free service. Then things began to slacken off, for, as I had suspected, there seemed to exist a regular clique who knew how to bamboozle or frighten the operator into putting them through for nothing. The arguments used by callers were most ingenious and amusing; also they were sometimes very forcible and trying. On several occasions, when it was alleged that the instrument must be out of order, a caller was kept arguing on the line whilst an inspector went quickly round to the instrument, and invariably found it O.K.! One man was overheard to remark to someone near the telephone that he could easily get over the operator, "Threaten to report them to the manager, and they will soon put you on."

I one day argued with a man for a quarter of an hour and then he finished up by saying, "All right old man, I see I can't get over you," and he put the penny in the box. Another had only got two halfpennies. Another would like the penny charged to his account for rental of a telephone somewhere about a hundred miles off. Another would go specially to London to report the matter to the General Manager. Another would sue the Company for damages —for never less than £1,000! It is almost needless to add that all these good people finish up by putting in the penny. The trouble is now almost stamped out as a general practice, but it is still watched and dealt with, when necessary, with a firm hand. The majority of cases investigated now are genuine cases of box out of order; these, with a little experience, are fairly easy to detect.

To show the lengths people will go to avoid payment of a penny let me cite the following case:—

At the Brighton Central Exchange recently a lady asked for a number and when asked to put in her penny stated she had put it in the wrong box by mistake and was not going to pay again; she insisted on being connected and we still insisted on having our penny. After a lengthy and somewhat heated discussion it appeared that a corporation instrument was fitted alongside ours, and she claimed to have put the penny in this, and if we sent round to the corporation office and explained they would give it to us. This lady did not get the number she wanted, and informed me in the end that we were all a set of —— fools!

The automatic box question demands very careful attention in the switchroom and, although of course distinctive markings on the signals indicate this class of service, I think such lines should always be dealt with by operators who deal with no other class of service and not distributed generally about the switchboard. I consider each call from these lines equals three ordinary calls, and the operator's work should be allotted accordingly. No matter how expert the operator may be there is on automatic box call-office lines a vast amount of extra talking to do and also extra movements to make on each call.

THE AUXILIARY LINE.

By C. R. SALT.

THE auxiliary line is unquestionably a very important factor in the telephone service, not merely from the subscriber's point of view, but also from a traffic standpoint.

It is of course very necessary that the canvasser, before approaching the subscribers for additional facilities, should be fully conversant with the subject in question. He cannot do better than pay a visit to one of the Company's exchanges, and so gain an insight into the working of the service from an exchange point of view, thereby familiarising himself with the method of procedure when an order for an auxiliary line is obtained.

The main difficulty in obtaining an order for an additional line to be used as an auxiliary often arises from the fact that an adjacent number to that which the subscriber already has cannot be given; it then becomes necessary to change the subscriber's number, but perhaps he has had the same number for years and consequently very strongly resents the proposed change to an entirely new one, even though he may thereby secure a consecutive number for his new line.

The subscriber's chief objections to this change are that his clients all know his old number and that he has it printed on all his stationery.

Now if the canvasser has made himself familiar with the method of dealing with changed numbers, which are of very frequent occurrence, he will readily be able to overcome the difficulty by explaining the system of pegging up the multiple so as automatically to advise every operator of the change. If this does not have the desired effect—which it usually does—then he will do well to suggest that the subscriber pay a visit to the exchange to which he is connected, where the subject can be fully described and demonstrated in practical operation.

It is very necessary that the canvasser, before approaching the subscriber, should know whether a consecutive auxiliary number can be given or not. This information is always given where records have been previously prepared, but it often happens that orders for additional lines are obtained without reference to records; in such cases the exchange manager should be consulted, and will be able to supply the necessary information and so prevent the possibility of any trouble arising after the order has been obtained.

THE LONDON UNDERGROUND PLANT.

By C. ELLIOTT, *Metropolitan Engineer.*

THE electrification of the tramways by the London County Council and other bodies in the London area is having very serious effects on the Company's plant, particularly on the underground portions of it. In spite of careful watching and co-operation with the tramway authorities on the part of the engineering department, frequent breakdowns occur through damage caused by the tramway contractors' men driving their steel wedges and guard rods through ducts and cables. It is becoming quite a common occurrence for reports to be received from divisional and local engineers that a cable from one exchange to another has broken down. Frequently considerable difficulty is experienced in tracing the defect, as it invariably happens that when damage has been caused the defect does not show itself or develop until after the ground has been filled in by the contractors, the mischief often having been done when opening trial or pilot holes. It becomes necessary in some cases to make a bridge test to ascertain the distance of the fault, and then to open the ground again to get at the exact spot. A troublesome fault of this kind showed itself on the morning of Sept. 13, on the 204-pair cable from London Wall to North Exchange; after considerable difficulty it was localised in a section in the roadway near the Angel, Islington, at a point bearing an enormous street traffic. It afterwards proved that the tramway contractors had opened a trial hole at this spot during the previous night and had filled it in again while the traffic was quiet, and it became necessary for the Company's men to adopt the same course, as it was absolutely impossible to open the road in the daytime. A wedge had been driven right through both pipe and cable, short circuiting and earthing every circuit. A new length of cable was run in and full communication restored by the morning of Sept. 22. During September similar trouble was also caused on the Victoria Embankment, near Charing Cross Bridge, in connection with the Victoria Embankment tramway route, the contractors driving a wedge through our 306-pair cable.

Of course the most serious part of such extensive damage is the interruption to the service, the loss from which can scarcely be estimated.

The Company will unfortunately probably suffer from this kind of damage for the next two or three years, as it is estimated that the complete electrification of all the tramlines in London will not be finished until 1909. In addition to dealing with these cases of serious damage to the plant, numerous diversions of pipes and alterations to overhead routes, due to the tramway construction, have to be dealt with in practically all districts.

MESSAGE RATES IN AUSTRALIA.

THE following extract from the President's address at the opening meeting of the session of the New South Wales Society of Electrical Engineers goes to show that some feeling has been aroused by the adoption of message rates for telephone service in the Commonwealth:—

"The most notable development in the Postal Telegraph Department has been the determination to install an up-to-date common battery board in the Hobart Telephone Exchange, as a preliminary step, and the proposed introduction of the toll system of charging for telephones. The latter proposal has been the cause of the appearance of a great deal of controversial matter in the newspapers, and it occurs to me that there are some points of view of the question which do not yet appear to have been put forward in favour of the toll system. There can be no doubt that the toll system, viewed dispassionately, is the most equitable system of charging, that is to say, making each user pay in proportion to the amount of benefit he derives from it; but though one may agree entirely with the principle of the system, the actual proposals may not be palatable. The flat rate has, of course, spoiled consumers for the reception of the method of charging so much per message, but probably if any gas or electric supply company were to suggest that they should charge a definite price per annum for connecting and supplying a building, irrespectively of the amount used or the number of lamps installed, so making the small user pay for the large, their proposals would probably be treated with the scorn they deserve. But that is practically what the flat rate appears to attempt. It is not quite equivalent to the flat rate that we all know as a charge for electricity, for the reason that it is fairly obvious that the more consumers there are connected to a telephone service the more valuable that service becomes to any individual subscriber, which is not the case with an electric lighting service, as an incandescent lamp has no more value to the consumer when there are ten thousand connected to the station than when there are only a thousand. But assuming, for instance, that any average subscriber to a telephone service may at some time or another communicate with, say, 20 per cent. of the total number connected, the service must be of greater value when there are ten thousand subscribers than when there are only a thousand. It is certainly safe to assume that of every extra hundred or thousand subscribers connected to an existing system every existing subscriber will number some proportion, however small, of these additional subscribers amongst those with whom he communicates. Strictly speaking, therefore, if the flat rate is charged, this flat rate should increase annually. But what an outcry there would be if this were attempted. By charging on the toll system, however, it will be easily seen that this increased value of service rendered automatically adjusts itself, as naturally the average number of calls per telephone increases with the number of possible callees (if I may coin the term), and the revenue per telephone increases in a like proportion. Where one is apt to cavil at the departmental proposals is, first, in the proposed initial charge for connection, and secondly in the use of the term free calls. The case would, in my opinion, be better met by making a comparatively low initial charge per annum to provide for fixed annual charges, and charge for every call from first to last, and do away with the obnoxious so-called free calls. In other words, charge subscribers on a similar system to the Hopkinson method, with which all central station engineers are familiar. The present proposals appear more like a maximum demand system, being nearly twopence per call for the first two calls per day, and one half-penny per call for all in excess of that number."

AMERICAN TELEPHONE PROSPERITY.

THE directors of the American Telephone and Telegraph Company have declared a quarterly dividend of 2 per cent. The dividend is designated as quarterly, placing the Stock upon a regular 8 per cent. per annum basis as against 7½ per cent. heretofore. Following the declaration of the dividend, President FISH said: "It was the sentiment of the directors that in view of the earnings of the Company and the outlook it seemed that this was the proper time to put into effect a policy that had been suggested for a long time, of putting dividends on a basis of 2 per cent. quarterly with the expectation of continuing them at that rate."

CORRESPONDENCE.

RELAY FAULTS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE idea of using a relay bridged across a fuse as an alarm arrangement described by Mr. Gilliland in last month's JOURNAL is not quite new. Some four years ago Mr. J. W. Warnock (now Chief of Jointers' Department) suggested this idea to me, which, however, he considered too expensive to be adopted, except for special or isolated fuses.

We have had for some time two special circuits in Royal Exchange on which the above arrangement is fitted, and needless to say we have no trouble at all, as when a fuse does go we hear the buzzer immediately.

Glasgow, Oct. 8, 1906. THOMAS PETTIGREW.

RENTAL REGISTERS AND FAULT CARDS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. Godfrey's letters in the August and October issues; in that for October he asks to be informed of the method of obtaining details of a subscriber's installation in London for the use of the contract agent.

Taking Mr. Godfrey's August letter: Paragraphs 1, 2 and 3. The registers being cut up for each day of the month instead of for months only is a great advantage in compiling the allocation sheet of the No. 2 Return. It also enables a good check to be kept upon the rendering of notices.

When it was arranged to eliminate the columns headed "Particulars of Apparatus" and "Mileage," it was thought that the "Mileage" column was of very little value in a large district, owing to the difficulty of keeping it correct, due to the large number of alterations and diversions which are continually being carried out.

With regard to the "Particulars of Apparatus" column, this is unnecessary. In the first place, the reason the column referred to was left out was to make room for the column "Date Notice sent." These are used to record the dispatch of the various accounts and notices; the first line showing the date the account is sent out, the second line date of the second notice, and the third line the date of the final notice. This column, it will be readily seen, is most important, as far as London is concerned, as we do not bring forward our outstandings in detail on the No. 2 Return monthly, but only show a summary for the month, giving the total of arrears forward, amount due, amount paid, amount written off, and arrears to next month. This can be done in London, as Head Office send to Salisbury House to check the cast in the Rental Registers and Outstanding Books, thus saving a good deal of work.

Paragraphs 4, 5 and 6. With the new cards, as mentioned by Mr. Greenham in the September JOURNAL, there should not be any difficulty in obtaining particulars of any installation. In London, however, it is very seldom necessary for the contract agent to refer to the fault cards. Unless the installation is a very large one, we use the following form for giving the contract agent particulars of installations, which I think gives all the information he requires:—

Name	Johnson & Co.
Address	19 Hanover Square, W.
Folio	I/L 25.
Telephone No.	"4569 Gerrard."
Class of Service	Unlimited.
Rental	£20.
Due Date	Jan. 7, 1907.
Term	Five years from 7/1/01.
Agreement Date	Dec. 8, 1900.
Notice required	Six months.
Details of Installation	Exchange line and two pedestal extensions.

We are in a position to give this information without difficulty, because when entering a new installation consisting of, say, one exchange line and two extensions into the registers, the entry for the exchange line is made in the usual way, with the annual rental opposite, say, £17, and below the address in the "Locality" column, on the second line, is written "two extensions" (pedestal or wall as the case may be) and the annual rental, viz., £3. If nothing further is added to the installation, the rental in the following year is brought forward as £20. Any subsequent additional apparatus is shown in a similar manner, so that we always have a full record of any subscriber's installation.

Paragraph 7. With regard to large installations, we find it necessary to keep a special register, and where there is a mixed board, viz, of internal extensions external extensions, and private lines, reserve one line in the register for each indicator on the local board. In the case of any alterations or additions, arrangements are made to insure that the local indicator number of the station affected shall be shown on the works order, for the purpose of keeping the register in agreement with the subscriber's installation.

Paragraph 9. I do not think there is much in Mr. Godfrey's remarks on this point, it being purely a question of management.

Paragraph 11. Having the information in our registers, as I have above described, it does not appear to me to be at all difficult to prepare a statement in regard to any ordinary installation. It is true that in some cases where a complicated installation exists, it is advisable to have a diagram of it, but certainly, so far as London is concerned, it is not considered necessary for a diagram in similar cases to that shown in Mr. Godfrey's letter. A card made out for each address would show full particulars of the installation, the external extension being marked on each card, showing the number of the indicator it is connected to respectively. I do not think that I need add anything to Mr. Greenham's remarks with regard to the new system of fault cards It is admittedly a step in the right direction, and should prove a ready means of obtaining full particulars of any installation.

The limit of 30 stations to each card will meet the majority of cases. In any installation above this number, no doubt an extra card or two will be required, but this is quite a different matter from having one card for each station. R. BRYSON.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH the introduction of any new system difficulties in regard to details are sure to arise, and no doubt as each district brings into use the new cards mentioned in my letter in the September issue, the same difficulties that have been met in London will present themselves. Perhaps the following extracts from a circular letter to the fault clerks may prove helpful:—

A set of fault cards is to be kept in alphabetical order for recording private wire faults for all private wires, irrespective of whether an exchange installation exists at the same address or not.

On the exchange installation apparatus cards all private wires working on switchboards must be shown, and in those cases where private wires exist, but terminate on individual instruments, an entry must be made on the apparatus card to show this.

In those cases where a subscriber has a single exchange line and one or more private wires, an apparatus card must be attached to the fault card.

Electrophone apparatus must be mentioned on the apparatus cards.

The method to be adopted in recording extensions is as follows:—

Suppose, for example, No. 4 jack is occupied by an extension which has another extension working off it, refer to the second extension as No. 4A, and give it a line to itself.

If No. 4 jack is connected by an extension to another branch switchboard, having one or more extensions or private wires but no exchange lines working off it, then enter particulars as follows:—

No. 4. Extension to.....line switchboard at.....
No. 4. (1).....
No. 4 (2).....

And so on.

Where there is any difficulty in describing an installation in such a way that an ordinary observer can see at a glance how it is arranged, then a skeleton plan must be prepared.

All such plans, together with descriptions of complicated installations, must be kept in a special cabinet or file, and should be carefully labelled with a reference number or code, and the corresponding number or code must be endorsed on the apparatus card to show that a special diagram or description exists.

Method of connecting Fault Cards to Apparatus Cards.

Each case must be treated on its merits. With small installations, where faults are few and far between, it will probably be found best to fix two or three cards to an apparatus card by means of an eyelet, but in cases where a fault card will probably be filled rapidly it will be best to eyelet the apparatus card and fault cards separately and connect them by means of a paper fastener.

In very large installations, where there are many cards to carry particulars of installation, these can be connected together; they need not be attached to the fault card, but of course must be kept adjacent to the fault card when in the cabinet.

After the eyelet has been fixed to the card it should be flattened by giving it a blow with a hammer, and the heads of the paper fasteners should be treated in the same way. In this way, space is economised.

It would be advisable to eyelet some cards on the left and some on the right, some at the top and some at the bottom, so that the cards will stand square in the cabinets.

October, 1906. G. F. GREENHAM.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MR. GODFREY has rendered timely service in directing attention to the omission in the new registers of the old familiar column "Particulars of Apparatus."

As regards the "Length of Line" column there need be no mourning over its disappearance, as in these days of underground installations the variations and vicissitudes of route mileage are well known. But as concerning "Particulars of Apparatus," the omission is indeed serious, and I doubt whether any experienced commercial man will be convinced by the Head Office theory quoted by Mr. Godfrey.

The Rental Registers are the recognised official record of the amounts due and payable to the Company, and it seems only reasonable that the explanatory details of the installation showing how the rental is made up should appear in the same record. All additions and alterations in rental have to be carefully noted in the registers, therefore it is surely wiser for the amendments in "Particulars of Installation" to be made concurrently in the same register.

I think the guiding principle should be to show in the registers the fullest details of the installation, so that the component parts and the tariff on which the charges are based can be readily seen, and thus furnish a ready reference whenever any question of re-arrangement crops up.

Manchester, August 1906. T. J. CLARK.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. Godfrey's article on "Rental Registers and Fault Cards" I would like to point out one or two items from a fault clerk's point of view.

In the first place he complains of the delay in getting information from the instrument department. Under the old rules the contract department would have to obtain the information from the rentals, and it would be just as easy for them to ring up the instrument department as it would be to go into another department in the same office to get it from the rentals.

Secondly, with regards to the installations being kept on separate cards for each station, this is being done away with by having two cards for each subscriber, one to take particulars of all the instruments, etc., and the other for all the faults.

Thirdly, the fault cards are just as likely to be correct as the rental registers, because whereas the fault cards are checked by the inspections every six months the rental registers are only checked when entered from the works orders (or at least this is all that used to be done three years ago).

With reference to having diagrams made out for large installations. This is a good idea and has already been done in London in the case of some of the large private wire subscribers. But if it were made a general practice it would throw a lot of extra work on the

London, August, 1906. "FAULT CLERK."

CHANGING MAGNETO INSTRUMENTS TO COMMON BATTERY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MR. OLDBURY has introduced a subject which will interest a large number of the staff. I think he might have gone a littte further into details, and should be glad if he would give figures on the following points:—

(1) Number of men engaged in actual fitting.
(2) „ „ supervisors and clerical staff.
(3) „ „ subscribers with single instruments.
(4) „ „ „ „ one extension.
(5) „ „ „ „ switchboards (giving average size).
(6) Total cost per instrument changed.

A. R. MACFARLANE.

Salisbury House, E.C., October, 1906.

CHANGING OF ACCUMULATOR PLATES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

With reference to Mr. Tattersall's article in the October issue, I was much interested, as no doubt others were, to read the useful description given of the method adopted in changing the faulty plates at Hull. Might I suggest that the value of the particulars would be enhanced if it were stated how many plates there are per cell; how many positives and negatives were affected; and what is the capacity of the battery in ampere-hours. If it could also be explained how the plates became damaged it would be of still greater importance in enabling us to know what to remember and avoid.

I presume the figures for specific gravity should record 1·215.

Blackburn, October, 1906. C. REMINGTON.

[The figures for density or specific gravity of electrolyte are generally written in thousands, without the decimal point.—ED. *N.T.J.*]

LOOPS BRIDGED BY KITE TAILS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

A RATHER interesting case came to light a short time ago, where corrosion had taken place at a spot where two wires of a loop had been bridged by kite tails. One wire had been cut down by a linesman in order to clear the cotton off, and on examination it was found that the wire for about an inch on each side of the cotton thread had gone green, and at the place where the cotton was twisted round the wire a groove had been eaten into the wire, thus weakening it. I think this should be noted by engineers at central battery exchanges, as loops are very often bridged by kite strings for weeks without a short circuit being caused. In wet weather electrolysis will be undoubtedly set up, and the wire thus weakened will come down in the first gale. It will be interesting to hear if similar cases have been noticed at other C.B. centres, or on ordinary party lines.

Nottingham. H. W. DIPPLE.

PICKWICK, FLUENCY AND CHESS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MAY I, more in sorrow than anger, correct your contributor who, in the last issue of the JOURNAL under "*Hic et Ubique*," described the contract departments as "swelling (*sic*) wisibly," but who does not know his Pickwick. It was not the Fat Boy, as he puts it, but a young woman who was the subject of this remarkable manifestation, which occurred at a tea-drinking under the auspices of the Brick Lane branch of the United Grand Junction Ebenezer Temperance Association, and was remarked upon by Tony Weller to his son in these words: "If this here lasts much longer, Sammy, I shall feel it my duty, as a human bein', to rise and address the cheer. There's a young 'ooman on the next form but two, as has drunk nine breakfast cups and a half; and she's a swellin' wisibly before my wery eyes."

In Mr. R. A. Watson's very interesting and useful article "The Business Letter," I observe he says, "it is a *natural sequence* that a man able to compose a creditable letter should be able to hold his own in argument." Is it? There are many men who can write excellent letters if they have plenty of time, which when read have an air of ready fluency; but it by no means follows that the writers are apt debaters. Frequently the reverse is the case.

And now that I am "on my feet" I should like to express my surprise that among all the reports of clubs, societies and staff gatherings, there is no mention anywhere of a chess club. Are there so few votaries of the game that sufficient support is not forthcoming? I should personally be glad to assist in forming such a club in London.

Oct. 13, 1906. EUSTACE HARE.

FOREIGN INTELLIGENCE.

Rotterdam.—The yearly report of the Rotterdam municipal system shows that at Jan. 1, 6,081 stations were working (an increase of 675 over last year) and 4,408 lines. The average number of calls per day was 50,810. There were 24 public call offices from which 39,940 calls were made. A new central battery exchange is being constructed with a preliminary equipment for 8,100 lines and an ultimate capacity of 18,000.

Switzerland.—The *Zeitschrift für Post und Telegraphie* gives statistics of the development of the Swiss telephone system during the past 15 years. The number of exchanges has increased from 117 to 693; the stations from 10,949 to 56,092; the local conversations from 5,181,681 to 29,914,161; the length of wire from 17,104 kilometres to 252,235; while the number of inhabitants to each telephone has decreased from 366 to 59. The telephone areas of Berne and Bale now contain 3,314 and 4,941 stations respectively.

Sweden.—The official statistics of the State telephone system for 1905 are to hand. The total number of telephones in use is now 81,994, of which Gothenburg claims 8,706, Malmö 3,821, Upsala 1,741, and Stockholm 13,954. The Stockholm figure does not, of course, include the stations of the Allmänna Company. The total number of chief exchanges was 154 and of sub-exchanges 1,226. The number of local calls was 224,177,000 and of trunk calls 9,122,780.

HIC ET UBIQUE.

IN a recent case of housebreaking (according to some of the daily papers) the burglars took the precaution to cut the telephone wires. In view of various smart captures due to the telephone, they would seem to have acted wisely. But another account says that they merely covered the instrument over. Either they thought the sound of their footsteps would be reproduced at the exchange, or perhaps some confused account of the Televue has found its way into burglarious circles. The idea of the burglar unnecessarily gagging his dumb enemy strikes one as humorous. "The wicked flee when no man pursueth."

IN the strange places of rural America the coming of the telephone is chronicled in a thoroughly characteristic fashion. In Jamesville (Wisconsin) you learn that "The telephone is a sure thing now as the places are dug, and the poles are strewn along the line. The boss says that they expect to have the work all done in two weeks." No item of news is too insignificant to be detailed. "Frances Whitecotton bought a dandy new 5-bar 'phone this week" says one paper. "Grandpa Robinson is putting in a new 'phone, west of Indian Creek" says another. The *Centerville (S.D.) Chronicle* says: "Ova Ellison had a 'phone put in the house on the Fernald Place where he is keeping batch." This is a very dark saying until you come upon the succeeding sentence: "The bachelors are getting quite numerous in this neighbourhood."

THERE is conscious, as well as unconscious, humour. The *Griffin (Ga.) News* states that "Milner"—a town, not a pro-consul—"is crying for a telephone system. She had to have it. By the time a native walks from one end of the street to another to convey a message he is too tired to work any more that day."

FROM the *Holdrege (Neb.) Progress*:

A patron of the Phelps county telephone system, who was always cross to the central girl, died suddenly, and one of the girls worried for fear she might have been too short with him at times, and her worry led to a dream. She dreamed she had gone to her celestial home and she determined to call up Mr. Blank and apologise to him. She asked St. Peter for Mr. B.'s number. St. Peter, who is the whole system, looked at her sorrowfully and said: "My dear, a copper wire laid within 4,000 miles of where he is now, would melt in a minute." The girl wept no more.

THE *Manhattan (Kan.) Republic* seems to treat an acute problem with unaccountable levity.

There is war among the "Hello Girls," there is a strike on the telephone exchange. Four operators, in order to show their belief in the righteousness of their cause, walked out Monday noon and didn't walk back. The cause was a new boss. Miss Essie Madden, a San Francisco refugee and experienced operator, was made chief operator commencing Monday morning. She immediately shut down on social visiting, changed some of the girls around, and gave out in no uncertain manner that henceforth the business alone should receive their attention, and social calls were to be actually cut out. This raised the ire of the girls and four of them quit work. In the afternoon four others took a lay off. However, the strike failed, and six of the girls were taken back. There has been need of improvement in the service, and we hope the change will be beneficial.

STAFF GATHERINGS AND SPORTS.

London.—The first annual excursion of the Eastern district staff took place on Saturday, Aug. 25. The party numbering about 50 started from the West India Dock Road shortly after 12.30 p.m. in two well-appointed four-horse brakes and proceeded *viâ* Blackwall Tunnel to Chislehurst. The afternoon was spent at cricket and in viewing Camden House and the celebrated chalk caves. At 5.30 p.m. the party sat down to a good and substantial tea, provided at the Tiger's Head. This being over, the company was addressed by Mr. C. E. Tattersall, divisional engineer, who said he was glad to meet so many of his men, and hoped that the drive would become an annual affair. From the remarks made in reply there is no doubt that another pleasant meeting will take place next year. Songs and recitations followed, etc., and at 8 p.m. a start was made for home, Limehouse being reached at 10 p.m., everyone having thoroughly enjoyed the drive. The arrangements were carried out by Foremen James and Court in a very satisfactory manner, and they fully deserved the vote of thanks passed to them.

Salisbury House Football Club. At a meeting of the Salisbury House staff, held on Oct. 19, it was decided to form a football club. Mr. L. Harvey Lowe was elected president with Messrs. Bailey, Davis, and Gray as vice-presidents. The officers and committee were also appointed. The club have arranged several fixtures on opponents' grounds and will also compete for the Clay football challenge cup, of which Salisbury House are the present holders. The subscription is 1s., and any further information is obtainable from A. E. Wild, hon. secretary, general office.

Brighton.—*National Telephone Football Club.*—On Friday, Oct. 19, a meeting was held at the White Eagle Hotel, Brighton, under the presidency of Mr. F. W. Roberts, the Brighton local manager, when a football club for the members of the staff was formed. Mr. F. W. Taylor was elected president, and Messrs. F. W. Roberts (local manager), H. Hatton (electrician) and H. Legge (engineer), vice-presidents. The committee consists of Messrs. Robinson, Johnson, Haseley, Davis, A. Faithfull, Dowman, Lamper, Hawkins and Wilson. Mr. P. Prudden was elected captain and Mr. F. Faithfull vice-captain. Messrs. E. A. Garrett and J. W. Stripp were elected as joint secretaries, and Mr. S. Lindfield honorary treasurer. It is anticipated that a good deal of interesting sport will be obtained by this club during the season.

National Telephone Cricket Club.—A smoking concert in connection with this club on the winding up of the 1906 season was held at the New England Inn, when Mr. H. Legge, engineer, presided over a gathering of about 40 members. After the usual toasts, the chairman congratulated the club upon the success it had obtained in winning five matches out of ten played, four having been lost and one drawn; he considered this very good for the first year. Mr. H. F. Johnson, the captain, replied, and Mr. Roberts, the Brighton local manager, who came in later in the evening, received an ovation. An excellent programme was provided, Mr. Brinklow presiding at the piano.

National Telephone Cycling Club.—The last run of the season took place on Saturday, Oct. 6, to Henfield, and was enjoyed by all who took part in it. There was a full muster for this wind-up run, thanks to the efforts of Mr. W. Steel. The afternoon was occupied with football, a side being made up of the Cycling Club members and friends. Tea was taken at the George Hotel, Mr. Roberts, the Brighton local manager, presiding. A start home was made at 7.30 p.m. and Brighton was reached at nine o'clock, after a good afternoon's enjoyment.

Swansea. It has been decided to form a thrift club here, and at a general meeting of staff on Oct. 15 officers and committee were appointed to take this matter in hand.

Plymouth.—The staff held their first annual picnic on Sept. 1, 1906, accompanied by the district manager. The party drove by brake to Downderry, where all the pastimes and pleasures of a seaside resort were enjoyed, the weather being brilliant. After tea (which reflected great credit on the committee) at the Sea View Hotel the evening was spent in harmony, which concluded a most enjoyable trip.

Dublin.—A most enjoyable picnic and dance in connection with the office and electrical staffs (organised by Messrs. McShane and Bury, of the district office) took place on Sept. 27, the place selected being Malahide. The weather was all that could be desired, and the outing was thoroughly enjoyed by everyone present. Sports were held on the beach during the afternoon, and the prizes were afterwards distributed by Miss Kirk, of Belfast.

Liverpool.—A whist drive promoted by the Royal Exchange, Liverpool, was held in the Edinburgh Café, on Saturday, Oct. 6, 1906. All the arrangements were successfully carried out, and gave the greatest satisfaction to the 105 guests present. The first prize for ladies was again carried off by Miss L. Durandu, that for gentlemen by Mr. McKelvie.

Burnley.—On Sept. 29 on the cricket ground at Gawthorpe Hall, kindly lent by Lord Shuttleworth for the occasion, a cricket match was held between teams representing the married and single of the area. The single batted first and compiled the total of 68 runs, T. Hargreaves being responsible for 34. The married followed, and only succeeded in making 46 runs (W. Hilton, 27 not out), the singles being the victors by 22 runs.

Norwich.—The staff here has formed an association football club. A playing ground has been obtained from the Corporation. Mr. O. W. Stevens (district manager) has been elected president and the local directors vice-presidents.

WHAT THE COMPANY IS DOING.

Four new exchanges have been opened during October, viz., Shirley (Birmingham), Aberlour (Aberdeen), Edzell (Dundee), and Tettenhall (Wolverhampton), making a total of 1,261; 3,048 new stations were added during September, making 395,388 in all.

LONDON.—*North Exchange.*—The work in connection with the extension of the switchboard by 1,200 lines is practically completed.

Gerrard Street.—The delivery of apparatus has commenced and a start has been made with the installation of the new common battery equipment for 9,520 lines.

Brixton Exchange.—A new common battery exchange was successfully opened on Oct. 13, with the simultaneous transfer of 772 subscribers' lines and 153 junctions from the old magneto exchange at Brixton. The new board is at present fitted for 1,500 subscribers' circuits, and the ultimate capacity is 8,000. A novel method of transfer was adopted in this instance, about which further particulars will be given in a subsequent issue.

BELFAST.—*Londonderry.*—The installation of the new common battery equipment (No. 9 type) for 460 lines was started on Oct. 10.

NEWCASTLE.—*Jesmond.*—A start has been made with the installation of the new common battery equipment for 700 lines.

LEEDS.—A site has been acquired for a new common battery exchange having capacity for 10,000 lines.

GLASGOW.—*Ibrox.*—An order has been placed for the new common battery equipment for 760 lines.

Hillhead.—A site has been acquired for the new common battery exchange having capacity for 10,000 lines.

ABERDEEN.—A site has been acquired for a new common battery exchange having capacity for 7,600 lines.

BRISTOL.—During the past few weeks private branch exchanges on the common battery principle have been brought into use at a large number of business establishments. This is quite a new departure in this town. The current for working these exchanges is in many cases obtained by means of power wires from the Central Exchange. The total number of private branch exchanges working to date is 21. The largest board up to the present provides for ten exchange lines and 50 extensions.

CHESTER AND NORTH WALES.—Estimates to open exchanges at Tattenhall, Gresford, Rhos and Johnstown have recently been authorised. In addition to this, the Postmaster-General has agreed to the extension of several of the existing areas, which will enable exchanges to be opened in the near future at Rossett, Bettws-y-Coed, Llandulas, Trefriw and Talybont, Pontybodkin, Caerwys, etc., where canvass is already being made, and it is hoped that the telephone service will be extended to these places within the next twelve months. These proposed exchanges, with the new exchanges of Llanrwst and St. Asaph which have been opened within the last few months, should give considerable impetus to business in this district. In order that the antiquarian beauties of Chester may be as little as possible interferred with, an underground system is about to be provided which will eventually accommodate some 6,000 lines. The work, it is hoped, will be commenced in the next few weeks. The Company is acquiring a site for the erection of new offices.

Wrexham.—In view of the increasing business here, which in the next few weeks will be further augmented as above mentioned by the addition of two new exchanges, a new sub-centre has been formed, and Mr. H. C. COYLE (lately of the construction staff in London) has been appointed Inspector-in-Charge. A small contract department has been formed at Chester, and commenced its duties at the end of last month.

NOTTINGHAM.—Underground work: Two miles of composite cable have been drawn into the pipes during the last month in connection with the underground scheme and additional junction circuits, Nottingham to Ilkeston. A like length of composite cable has also been drawn in, in connection with the additional junctions required between Bulwell and Nottingham.

OXFORD.—A private branch exchange system has been arranged for at New College, Oxford. The underground extension work in Oxford is now approaching completion; 52-pair cables in Cornmarket and St. Aldates were drawn out and replaced by 204-pair on Sunday, Oct. 7, as part of this scheme.

READING.—The *Reading Standard* has arranged to publish a monthly list of new subscribers in the area.

EDINBURGH.—A private branch exchange, comprising four junction circuits and eight extensions, has been installed at the premises of Messrs. Thos. Scott & Company.

PAISLEY.—Up to the present the Company has laid the following lengths of duct: 3-in. cast-iron pipes, 11 miles 1,393 yards; 3-way concrete blocks, 1 mile 290 yards; 6-way concrete blocks, 546 yards; 9-way concrete blocks, 25 yards; making a total duct mileage of 17 miles 484 yards; 58 distributing poles have been erected, and 36 brick chambers and 35 manholes built. There are still two small sections of about 150 yards each to be completed with single pipe, and when this has been done the drawing in of the cable can be commenced. It is hoped that at least one section, viz., East, will be completed before the end of the year.

GREENOCK.—Three central battery private branch exchanges were opened on Sept. 20 at Messrs. Scott's Shipbuilding & Engineering Company, Limited, Greenock. The exchanges are situated one in each of two shipyards, and one in the engine works. The total number of stations is 37, and the ultimate capacity of the switchboards 150. Six junction lines connect the branch exchanges, and there are five lines direct to Greenock Exchange. An order has just been booked for a private branch exchange of fifteen stations and two junctions, on the measured rate, at the Gateside Combination Hospital, Greenock.

SOUTHAMPTON.—An additional 1 mile 824 yards of 500-pair cable has just been drawn in to supplement exhausted capacity in the neighbourhood of the docks, and will be brought into use next month. An additional 1,000 test frame has just been completed and brought into use at Southampton Exchange, and portable accumulators displaced by a local power-plant installation with "Chloride" accumulators and switchboard and dynamotor of the "Western Electric" type which takes the load of the exchange.

BOURNEMOUTH.—A start has just been made on the extension of the underground system from its present termination at the west end of the town to Constitution Hill, a good step towards the eventual linking up of Bournemouth, Parkstone, and Poole on an unbroken route of underground cables.

The following lengths of duct and cable have been laid:—

1¼ mile of duct at Blackburn.
1 ,, ,, ,, Balshagray, Glasgow.
1½ ,, ,, ,, Nottingham.
1 ,, of cable at Belfast.
1 ,, ,, ,, Dudley Hill.
1½ ,, ,, ,, Hamilton.
1¼ ,, ,, ,, Leeds.
1 ,, ,, ,, Liverpool.
1¼ ,, ,, ,, Loughton.
1 ,, ,, ,, Tunbridge Wells.
1½ ,, ,, ,, Withington and Didsbury.
1¼ ,, ,, ,, Stockton.

LOCAL TELEPHONE SOCIETIES.

Blackburn.—The first meeting of the session was held in the Weavers' Association Rooms on Oct. 5, 90 members being present (a record number). Letters of apology for unavoidable absence were read from Mr. Claxton, Mr. Shepherd and Mr. Prout. A paper was read by Mr. Remington on "Power Plants." The correct treatment of accumulators was fully dealt with, and it was made fairly obvious, by information collected from other districts and diagramatically shown, that there is a serious leak financially and electrically due to harmful and unnecessary overcharging of accumulators. An interesting and somewhat novel feature introduced for discussion was a system of lighting the Company's premises with low voltage lamps, current being taken from the 24-volt accumulators. The author's point was that, in addition to getting a reliable and steady supply of current, the lighting accounts would show a reduction of 50 per cent. if the system could be adopted. The subject was attentively listened to, and proved most interesting and instructive. The main points were fully illustrated by excellent diagrams, and after a lengthy discussion, during which many questions were dealt with, a hearty vote of thanks to Mr. Remington brought a very successful meeting to a close.

Plymouth.—The first meeting of the newly-formed telephone society was held at the Central Exchange on Oct. 3, when the President, R. A. Dalzell, gave a most interesting and instructive paper entitled "Some Phases of Telephone Work." The lecturer illustrated by means of curves some very interesting and vital points on the control and administration of finance. The society has many energetic members and promises to be very successful.

Sheffield. The first meeting of the session 1906-7 was held on Oct. 17 and included the following:—The address of the President (R. C. Bennett); an essay entitled "What the Telephone Said," by Mr. W. Thyne; and a paper by Mr. W. Parfitt on "Wayleave Reflections." The society ha purchased an optical lantern from the funds in hand. It has been decided to offer prizes to the writers of the best papers on subjects set by the committee.

Coventry.—A meeting of the staff of the South Midland district was held at the district office, Coventry, on Tuesday, Oct. 16, under the presidency of Mr. John Mewburn, district manager, when it was unanimously decided to form a telephone society. It was further resolved that a committee be formed to frame rules so that they may be discussed at the next meeting to be held early in November.

Newcastle-on-Tyne.—A meeting of the staff of this district was held on Oct 16, when it was decided that a telephone society be formed on similar lines to those mentioned in the JOURNAL for October. A provisional committee was elected, and asked to be responsible for the first paper to be read on the 25th, after which a general meeting will be held and the necessary officers elected.

Cardiff.—At a meeting of the staff held on Oct. 15, it was decided that a telephone society should be established, and Mr. Dalzell, superintendent of the province, asked to be president for the first year, the district manager acting as vice-president. It was also decided that meetings should take place on the second Tuesday in each month, the first of such meetings to be held on Nov. 13 next. It is anticipated that about 40 members of the staff will become members of the society prior to the first meeting.

Brighton.—A general meeting of the telephone society was held on Tuesday, Oct. 16, Mr. F. W. Taylor, district manager, in the chair. The officers and committee for the coming season were appointed, and the formation of the syllabus was delegated to the committee and will be published in due course.

Swansea.—A telephone society has been formed by the operating staff. The first meeting took place on Wednesday, Oct. 3, at 8 p.m., when a paper was given by the Exchange Manager on "Efficient Operating: Some Ways and Means of Attaining Same." There was an excellent attendance, and future meetings (which it has been decided to hold monthly during winter months) are being looked forward to with much interest. It has also been decided to form a society for the staff generally (in addition to the foregoing) on the same lines as other telephone societies now existing in various parts of the country, from whom the Swansea Society will be pleased to receive any hints as to method of procedure, etc.

Leicester.—The formation of a local society is being discussed, and although the membership will be comparatively small, good results are anticipated. Mr. J. Ashton, district manager, has offered prizes for the three best papers.

Portsmouth.—A new telephone society has been formed here and the following very interesting programme has been arranged:—Oct. 25: Telephony on the Continent of Europe (with lime-light views), H. Laws-Webb. Nov. 22: Points on Engineering, H. Baker, G. H. Crampton and J. G. A. Ewing. Dec. 13: The District Office and its Work; Contract Department Working, R. J. Parsons, H. Higgins and F. Albany. Jan. 24: A Telephone Circuit, W. Padget and F. Bennett. Feb. 28: The Cardinal Points of Operating, S. J. Pharo. March 28: Telephone Reminiscences, C. J. Phillips.

Birmingham.—We are very pleased to note that a new society is also being started here.

Dublin. The staff have resuscitated the telephone society here. The meetings are held fortnightly, and a very instructive syllabus for the session has been arranged. The society has a membership of 53, and the subscription is 2*d.* per month. The first meeting was held on Oct. 8 at which a large number of the staff attended. Syllabus.—Oct. 8: Power Plant, M. E. Connor. Oct. 22: Switchboard Construction, J. McCann. Nov. 5: Underground Cable Distribution, W. J. Dalgity. Nov. 19: Traffic, G. L. Wallace. Dec. 3: Contracts, R. J. Bartley. Dec. 17: Miscellaneous, opened by C. H. Sibley. Jan. 7: Switchboard Maintenance, R. H. Gilliland. Jan. 21: Operators in Training, Miss A. Duggan. Feb. 4: Overhead Construction, J. W. Hobson. Feb. 18: Testing, D. Kirkwood. March 4: Instruments and Inspections, F. Gardner and M. Hughes. March 18: Office Work, T. J. Early. March 25: Miscellaneous, opened by C. H. Sibley.

NEWS OF THE STAFF.

Mr. F. G. C. BALDWIN, A.I.E.E., Engineering Inspector, Sheffield, has been transferred to Birmingham as Engineer. On the occasion of his leaving Sheffield he was presented by the District Manager, on behalf of the staff, with a handsome oak-cased aneroid barometer, as a token of the esteem and respect in which he was held. In making the presentation the District Manager voiced the feelings of the staff when he expressed regret that Mr. Baldwin was leaving Sheffield, and also when he wished him every success in his new appointment.

Mr. W. F. TAYLOR'S departure from Glasgow was the occasion of a farewell smoking concert at the Royal Restaurant, West Nile Street. Mr. Valentine presided over a company numbering about 100 of the Glasgow staff, and a very pleasant evening was spent, the programme being a highly interesting and varied one. During the evening Mr. F. Douglas Watson presented to Mr. Taylor a drawing-room clock and scarf pins, which he asked him to accept from the staff with their best wishes for his happiness and success in the Metropolis.

Mr. T. J. CLARK, Chief Clerk at Manchester and the JOURNAL'S correspondent in the Manchester district, contributes this month a brief but suggestive article on "The Cheerful Worker." Mr. CLARK has been a member of the Company's staff since Dec. 3, 1879, so with nearly 27 years' service to his credit he has had ample experience of the importance of cordial relations between departments and between the staff and the public, and is well qualified to speak on the subject.

Mr. J. MCCANN, of the Engineer-in-Chief's staff, has been promoted to the position of Foreman on the newly-formed Irish switchboard construction staff.

Mr. C. F. MOORHOUSE, on the occasion of his leaving London to take up the position of Contract Manager at Brighton, was presented with an American roll-top desk and chair, subscribed for by the Metropolitan staff. Mr. C. B. Clay, who was accompanied by Messrs. Bailey, Harvey Lowe, Elliott, Davis, and other heads of departments, made the presentation on behalf of the subscribers. In doing so he stated that the news of Mr. Moorhouse's departure from London had been received with regret in all staff circles, and, that whilst all would regret his departure, he could only express the wish that Mr. Moorhouse's absence would be a temporary one, and that they would have him back again in London before long. Mr. Clay then referred to the large number of the staff, including all the chiefs, who had subscribed to the testimonial. On handing Mr. Moorhouse the key of the desk, Mr. Clay wished him every success in his new position and a speedy return to his many friends in London—a remark which was heartily endorsed by all present. Mr. Moorhouse, in reply, said it was indeed a great pleasure to know that he had the good wishes of those with whom he had worked in all grades of the service since the days of his apprenticeship, now twenty years ago; and expressed the pain he felt at leaving his good friends. Since he had held the position of Contract Manager he had received nothing but courtesy from Mr. Clay and great assistance from the staff, and hoped that similar good work would be extended to his successor, Mr. Taylor.

Mr. F. H. BARBER, late Contract Agent, Birmingham, has been transferred to a similar position at Leicester, vice Mr. S. C. COWARD, transferred to Liverpool as Chief Inspector.

Mr. A. E. DUNKLEY, Inspector, Leicester, who has been appointed Chief Inspector at Burton-on-Trent, was presented with a marble timepiece by his late colleagues as a token of esteem.

Miss G. TOWNSLEY, Operator, Leicester, has been promoted to the position of Supervisor.

Mr. J. O'CONNOR, Canvasser, Brighton Contract Department, has been appointed Contract Agent, Reading.

Mr. A. L. CURLING, Local Manager, Chatham, has been appointed Local Manager at Tunbridge Wells in place of Mr. J. K. MURRAY, transferred to Glasgow as Assistant Engineer.

J. C. NICHOLLS, Wayleave Officer, Watford, has been appointed Local Manager at Chatham.

Mr. G. P. MORRISON, Chief Fitter, has been promoted to the position of Chief Inspector at Manchester. He entered the Company's service in 1894, and the whole of his service has been in the Manchester district.

Mr. J. M. CONWAY, late Chief Inspector at Manchester, has been promoted to the position of Local Manager at Whitehaven. On leaving to take up his new duties he was presented by Mr. Scott, district manager, on behalf of the staff, with a gold hunter watch, suitably engraved, as a token of esteem on the part of his old Manchester colleagues. Mr. Conway has been with the Manchester district for 22 years, and during the past eight years he has held the position of Chief Inspector.

Mr. C. A. INMAN, on the occasion of his transfer from the City Engineering Department to Liverpool, was the recipient of a handsome pedestal lamp and silver fusee case as an expression of goodwill and esteem on the part of his friends and colleagues in London.

Mr. W. A GENT, Local Manager at Pontypool, has been temporarily transferred to Newport as Chief Wayleave Officer, owing to the closing of Pontypool as an independent centre.

Mr. E. C. GEORGE, Inspector, has been transferred from Bridgend to Pontypool.

Mr J. GILBERT, Switchroom Inspector at Newport, who has been promoted to be Inspector at Bridgend, has been presented by the local staff with a silver cigarette case suitably inscribed.

Mr. J. C. SMITH has been transferred from the position of Inspector-in-Charge at Bridgend to that of Assistant Engineer, Swansea.

Mr. F. JERVIS, Faultsman at Merthyr Tydfil, has been promoted to be Inspector at Tredegar.

Mr. L. CRECRAFT, Observation Officer, Nottingham, has been transferred to Birmingham to a like position.

Mr. H. GRAY, Inspector, Nottingham, has been transferred to Birmingham in connection with the work of erecting common battery sections of new switchboard at this place.

Mr. M. B. OLDBURY, Inspector, Derby, has been transferred to Nottingham.

Miss A F. WEEKS has been appointed Clerk-in-Charge at Bath.

Miss E. E. VINCENT, formerly Local Office Clerk, Lowestoft, has been transferred to the Metropolitan Offices.

Mr. E. S. ABBOTT, Inspector, Lowestoft, has been transferred to Stockport.

Miss BATEMAN was presented on Oct. 6 with a dressing case and silver-mounted photo. frame by the Watford staff on the occasion of her leaving the Company's service.

Miss M. I. B. WEBSTER, district office, Edinburgh, has resigned. She was presented on leaving with a gold-mounted umbrella.

Mr. E. H. AVIS, of the Electrician's Department, Edinburgh, has been tranferred to the Metropolitan province. His friends in Edinburgh have forwarded to him a smoker's cabinet, case of pipes, etc.

Mr. W. PRITCHARD, Inspector, Bradford, who has been promoted to be Inspector-in-Charge at Skipton, vice W. Banks resigned, was presented by the Electrical staff with a smoker's cabinet and a framed enlarged photograph of his colleagues.

Mr. T. GLEW, of the Engineer-in-Chief's Department at Nottingham Factory, was presented on Sept. 22 with a massive marble timepiece, on his resigning, after sixteen and a half years with the Company, to start in business on his own account. The presentation was made by Mr. Briggs on behalf of the combined Engineer-in-Chief's Testing Department and Factory staffs.

Mr. F. A. HUNT, the Divisional Engineer of the City district, is away on leave of absence for one month with a view of recruiting his health. He carries with him the best wishes of the staff, together with their earnest hope that his recovery will be speedily and permanent.

Mr. W. T. HOWELL has been appointed Contract Agent at Plymouth.

Mr. J. B. SALMON, Acting Local Manager at Burton-on-Trent has been awarded the silver medal for honours telephony. He was also presented with a special prize of £3 by the Derby Corporation on behalf of the London City and Guilds.

T. SHERRATT, Birmingham, obtained a 1st class at the City and Guilds Examination in Telegraphy and Telephony. He also passed 1st class in Algebra and Arithmetic in the 1st stage class examinations at the Birmingham Municipal Technical School.

EDGAR CECIL KEW, Apprentice at Northampton, passed 1st class Elementary Stage Magnetism and Electricity.

ERNEST C. BAILEY, Apprentice at Kettering, passed 1st class Mathematics, Stage I.

H. FAWCETT, Junior Clerk, Cheltenham, was successful in passing, with distinction, the London Chamber of Commerce Shorthand Examination held in May last.

Mr. H. P. BAKER, Swindon, has been successful in passing 2nd class in the City and Guilds of London Ordinary Grade Telegraphy and Telephony Examination.

Glasgow Operating Staff.—Miss A. MCKERRELL, of Royal Exchange, has been promoted to the rank of Supervisor in same exchange.

Miss C. MITCHELL, of Royal Exchange, has been promoted to the rank of Supervisor in Hillhead Exchange.

Miss A. MCNAIR, of Tron Exchange, has been promoted to the rank of Supervisor in Bridgeton Exchange.

Miss L. CAMERON, of Charing Cross Exchange, has been promoted to the rank of Supervisor in Douglas Exchange. Before leaving the members of the exchange presented her with a handsome purse, which they asked her to accept along with their good wishes.

Dundee.—The following members of the staff have gained certificates at the local Technical Institute:—J. Bell: 1st class, Telephony Honours; 2nd class, Electrical Engineering, 2nd year; 2nd class, Electricity and Magnetism, 3rd year. R. Moir: 1st class, Mathematics, Stage I; pass, Electricity and Magnetism, 1st year. R. Hunter: 1st class, Telephony and Telegraphy, Ordinary Grade. J. Brown: Pass, Mathematics, Stage I. H. Harper: Pass, Electrical Engineering, Theory, 1st year; 1st class, Electrical Engineering, Practice, 1st year; pass, Mathematics, Stage I. K. Mathew: Pass, Electrical Engineering, Theory, 1st year; 1st class, Electrical Engineering, Practice, 1st year. A. Harper: Pass, Mathematics, Stage I. J. Lonie: Pass, Electricity and Magnetism, 1st year; pass, Mathematics, Stage I. H. Annan: Pass, Electricity and Magnetism, 1st year.

Birmingham.—At the City and Guild Examination in Telephony the following results were obtained:—A. H. Tilt, 1st class, Honours Grade; F. Clark, 1st class, Ordinary Telephony; F. Tuffin, 1st class, Ordinary Telephony; A. R. Bradshaw, 2nd class, Ordinary Telephony.

THE following members of the **Head Office** and **Metropolitan** staffs have been successful in obtaining Institute certificates at the Northampton Institute for the work of the session 1905-6:—Course certificates: R. W. Gregory, E. Gregson, T. A. Mason, J. H. Pattman, J. G. Phillips, S. J. Bees, D. McCall, H. G. Bishop, G. O. Rawlinson, W. R. Thorpe, C. D. Cann, W. E. Smith, W. E. Twaites. Class certificates: H. Gould, E. Merriman, H. E. Morrish, W. Rowell, W. T. Ashton, E. E. Robinson, G. C. Geisler, L. Fitzjames, T. Kierman, E. Merriman, B. P. Pickwick, G. Wright. It is interesting to note that the number of members of the Company's staff in London joining the technical classes provided at the various institutes this session is 219, as against 124 last session.

MARRIAGES.

Mr. W. J. MILLER of the General Manager's Office (Railway Wayleaves) was married on Sept. 29 to Miss DENTON. He was presented with a set of cutlery and spoons by his colleagues.

Mr. D. BALDWIN of the Engineer-in-Chief's Department (pattern room) was married on Sept. 11, and as a memento of the occasion he was presented with a handsome overmantel subscribed for by his colleagues.

Mr. J. MILLS, Outstandings Officer, and Miss L. P. BOYD of the Post Office Fees Department, Cardiff, who were married on Sept. 12, have been presented by the staff with a handsome marble clock suitably inscribed.

Mr. A. LESLIE MAY, Exchange Manager, Birmingham Central, was married on Oct. 13 to Miss MEAKIN. They were the recipients of a marble clock, etc., from the operating staff.

Miss HOLLOWAY, Senior Operator, Evesham, on leaving the service to be married, was presented by the staff with a dinner cruet.

Miss MACKAY, Supervising Operator, Aberdeen Central Exchange has left the service to be married.

Mr. J. RADFORD, Inspector-in-Charge of the Swindon Centre, and formerly Chief Inspector at Bath, was married on Sept. 15 to Miss A. M. DE VINE, Supervisor, Bath Exchange, who has been in the Company's service for ten years. Mr. Radford was presented with a portmanteau, hair brushes, and umbrella on the occasion of his leaving Bath, and Miss de Vine was the recipient of a tea service.

London Traffic Department.—*Resigning to be married:*

Miss E. M. HEWSON, Operator, Bank Exchange.

Miss C. B. GOURLAY, Operator, Gerrard Exchange.

OBITUARY.

Mr. H. CULPECK, on Friday, Sept. 28, after an illness of six weeks. Deceased was a very old servant, having joined the Company's staff nearly 23 years ago as an operator. For some long time past he was attached to the City staff (London) as an instrument inspector.

THE

National Telephone Journal

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TELEPHONE MEN.

VII.—ALBERT ANNS.

ALBERT ANNS was born in the year 1857 at Bexley, in Kent, and was educated privately and at the City of London College.

His first experience of commercial life was in a city merchant's office, but obtaining a nomination for a vacancy in the East and West India Dock Company he received an appointment after a competitive examination.

In 1882 he was selected by Colonel J. L. DU PLAT TAYLOR, the then Secretary of the Dock Company, as a candidate for the position of Accountant to the United Telephone Company, and, being successful, took up his new duties on June 18, 1882. The issued capital of the Company at that date was £400,000.

On the amalgamation of the three principal Telephone Companies in 1889, with Mr. F. R. LEVLAND as President, Mr. ANNS was appointed Accountant to the re-constituted National Telephone Company, and in that capacity had to consolidate and bring into harmony the books and accounts of the three Companies, which, as may be imagined, was no small job.

In the following years ten more telephone undertakings became merged in the National, and eventually the National Telephone Company undertook the responsibility of conducting the telephonic business of the entire United Kingdom.

Upon the death of Mr. THOMAS BLAIKIE, in 1890, Mr. ANNS was appointed Secretary of the Company.

In 1892 the New Telephone Company was resuscitated with the object of competing with the National in London and elsewhere, but the sudden death, in November of that year, of the late Duke of MARLBOROUGH, the Chairman of the New Company, deprived the concern of its leading spirit and ultimately caused the New Company to pass resolutions to wind up, when Mr. ANNS was appointed the Liquidator.

The business of the New Telephone Company was carried on by the Liquidator until August, 1898, when it was finally wound up.

The only other general telephone license outside the National Company was in the possession of the Stanhope Telephone Company, which was liquidated by Mr. ANNS and finally wound up in September, 1898.

In 1896, mainly on the initiative of Mr. GAINE, the General Manager, a Pension Fund was created for the benefit of the Company's employees in receipt of £100 per annum and upwards, and Mr. ANNS was appointed one of the Staff Trustees and Secretary to the Fund.

Thanks to the liberal manner in which the Directors of the Company started the Fund it is now in a strong financial position, the number of contributing members being 1,460 with invested funds of over £111,000.

At the beginning of 1899 arrangements were made with the Provident Clerks and General Mutual Life Assurance Association to enable employees of the Company, by a small weekly or monthly payment, to obtain the benefit of life assurance on favourable terms. Mr. ANNS was appointed Agent, and the liberal commissions allowed him by the Association plus the percentage which the Company generously contribute, is divided at the end of each year amongst the members in the Company's service insured under the scheme.

The number of policies issued under this scheme is 380, insuring about £62,000, with annual premiums of upwards of £3,000.

In 1902 the arrangements were enlarged to cover insurances against accident or sickness.

At the end of 1902, the Electrophone, Limited, a company formed for transmitting music, &c., from theatres and other places to subscribers' residences, was re-constructed. Mr. ANNS was appointed one of the Liquidators to wind up the old

company, and subsequently accepted the position of Secretary to the new company.

The issued capital of the United Telephone Company in 1882 has been referred to, and the following figures will give some idea of the amount of capital which has since been raised and the marvellous expansion of the Company's business:—

At the present time the share capital and debenture stocks issued amount to over £10,200,000, the gross annual revenue is nearly £2,500,000, and more than £12,500,000 has been expended on capital account, with an accumulated reserve fund of over £2,000,000.

The changes which have taken place in telephone business generally and in the magnitude and administration of the Company's business in particular during Mr. ANNS' tenure of office have been phenomenal, and the influence that he has had on the destiny of the Company can only be understood and appreciated by those who have been brought into close touch with him.

During his time of office, the Presidency has been filled by Mr. F. R. LEYLAND, Mr. JAMES STAATS FORBES, the Right Hon. Sir HENRY FOWLER, M.P., and Mr. GEORGE FRANKLIN.

The office of Secretary to this Company is a very onerous one, entailing as it does scrupulous accuracy in dealing with the mass of statistics from all parts of the country which have to be brought together and properly marshalled to produce the figures presented to the shareholders half-yearly, and the registration work in connection with the capital of the Company is no slight task, the stock and shareholders now numbering 15,658.

In Mr. ANNS the staff have a friend who is ever guardful of their interests, and his unfailing good nature and cheery, helpful disposition have made him one of the most popular members of the Head Office staff, and endeared him to all his fellow-workers.

He is an enthusiastic telephone man, and, like most telephone men, has no great opportunities for recreation, but he manages to keep himself fit for his multifarious duties by a limited indulgence in golf and tennis, and is also addicted to the gentle arts of painting and horticulture.

Mr. ANNS is a Fellow and Member of the Council of the Chartered Institute of Secretaries, and an Associate of the Institution of Electrical Engineers.

THE STORY OF THE CUT-OFF.

By J. S. R.

(With apologies to Sir Conan Doyle.)

"My dear Watson," said my friend Sherlock Holmes, as we sat together in his chambers in Baker Street, "your complaint of being unaccountably cut off when conversing on the telephone just now explains something in your personal appearance which I noticed as you came in, but could not then account for. You say the lines and instruments have been tested and found to be in perfect order, and also that the officials at the exchange say that no premature disconnection was made. Both these statements are perfectly true, as you yourself do the cutting off.

"When using the telephone you sit on the desk on which it is placed. You then lean back against the drawers, and your coat resting on the cradle of the telephone bears it down and thus disconnects the speaking portion. As the telephone is on the left you should sit on the right-hand side of the table."

One would have thought that he had been present at the time, as his description so accurately coincided with my movements, but I knew from previous experience that he would make clear to me the foundation on which his deductions had been based, and I awaited the details.

"This case," he continued, "presents no complex features. That spot of ink on the back of your coat is quite fresh, and indicates that you sat on a table on which ink had been flicked from a pen. The direction of the comet-like tail of the blot shows it to have been on the left side of the table. Your coat bears the marks of the handles of the drawers against which you leaned, and also distinct indentations caused by the two points of the cradle."

"And now, Watson," he concluded, "I am surprised that you, as a doctor, do not take greater care of your health, and change your coat when you have been out in the rain. Had you done so the impressions would not now be visible."

FARADAY MEMORIAL.

ON Nov. 24 the Faraday Memorial tablet in the North Exchange, London, was unveiled by Lord KELVIN, but owing to pressure on our space a description of the ceremony has been deferred to our next issue.

SAGS AND STRESSES IN OVERHEAD WIRES.

By T. FLETCHER, M.I.E.E.

ONE of the most important and, at the same time, interesting duties devolving upon the constructor of aerial lines is the determination of the proper stress to which the wires shall be subjected during the process of erection, the object being to ensure that, whilst they shall not be unnecessarily slack at high summer temperatures, they shall not be so taut at low winter temperatures as to be unable to bear the augmented stress to which they are then liable to be exposed. In this connection it may be explained that, of course, only normal climatic conditions, such as are experienced in this country year in and year out, are considered, because there are certain abnormal conditions which sometimes arise, such as a high wind suddenly springing up when wires are heavily coated with frozen dew, and in which no wires, however well erected, can escape destruction.

It is a fortunate accident that most experienced wiremen have acquired the art of pulling up new wires in all ordinary conditions of weather to the proper tension, and anything like extensive failure is rare. In fact, the hand of the practised wireman seems to *feel* the proper tension, and the eye of the experienced foreman recognises pretty nearly the proper amount of sag. But it is just here that the personal element comes in, and whilst on the part of some men there is a tendency to leave the wires rather slack, there is a more general tendency on the part of others to pull wires up as taut in hot weather as in cold.

It is therefore highly desirable that reliable data should be available for the construction of tables showing the requisite stresses and resulting sags at different temperatures for wires erected in varying spans.

Tables of this kind have been prepared and published in the past for guidance in the erection of telegraph and telephone wires.

In 1874, in Calcutta, Mr. R. S. BROUGH, of the Indian Telegraph Department (an old schoolfellow of the writer), published a small pocket-book of formulæ for the use of telegraph engineers. In this he pointed out that the length of itself which any wire can just support without breaking is constant for the same kind and quality of wire, of course irrespective of gauge. He also gave a table showing the relative dips for various spans of iron wire, though he omitted to give temperature. He further pointed out that the dip for any span is the same for all gauges of any of the same kind and quality of wire, and that it varies approximately as the square of the length of the span.

In 1882, Mr. TREUENFELD published in the *Electrician* a very interesting article dealing with this subject. In this he gave a table of dips for different spans at varying temperatures. Tables have also been given in the handbooks of CULLEY, PREECE and SIVERWIGHT, etc.

In most such tables, a factor of safety of four has been adopted; *i.e.*, they have been calculated on the assumption that at the lowest normal winter temperature, the wire is not to be subjected to a stress exceeding one fourth of its breaking weight. In the tables recently issued by the Post Office, a factor of four is taken for iron and copper, and a factor of three for bronze. But, although it may seem terribly bold and unorthodox to breathe the suggestion, it may be doubted if these conditions are adhered to in practice. Indeed, the "regulation" of Post Office wires seems to indicate that a lower factor of safety is adopted in practice, and that if the tables were rigidly adhered to the wires would be appreciably slacker than they are.

One of the most important features in the behaviour of aerial wires is that due to elasticity, in virtue of which wires elongate more or less when subjected to stress, and tend to recover their original length when the stress is relaxed. This elastic effect was usually ignored in tables formerly issued, but it is apparently this which, in practice, saves wires from destruction by changes of temperature.

The formulæ usually employed in the preparation of the tables are as follows:—

Let l = length of span, in feet;
d = sag at minimum temperature, in feet;
d_1 = sag at any higher temperature, in feet;
s = tension at minimum temperature, in pounds;
s_1 = tension at higher temperature, in pounds;
w = weight per foot of wire, in pounds;
L = Length of wire in span, in feet;
T = difference of temperature, in degrees F.;
K = co-efficient of linear expansion, per degree F.

Then $d = \frac{l^2 w}{8 s}$ ..... (1)

$s_1 = \frac{s d}{d_1}$ ..... (2)

$d_1 = \sqrt{d^2 + l^2 (T \times \frac{3}{8} K)}$ ..... (3)

From (1), if any tension be assumed, the corresponding sag is obtained.

From (2), knowing the tension and sag at any temperature, by assuming any other sag the corresponding tension can be calculated.

From (3), given the sag at one temperature, the sag at any other temperature can be obtained.

It will be noticed that (3) contains the factor K, depending on the temperature, but that there is no factor involving the elasticity of the wire.

It has always been found in practice that wires erected according to the tables were too slack for good regulation, and the experiments herein described had for their object the checking of the old tables and the drawing up of new ones, which, by taking elasticity into account, should be more accurate and give better results in practice.

It was with a view to putting the question to practical test that the Engineer-in-Chief sanctioned the erection of the experimental wires on which careful and continuous observations might be made. All these wires were erected under the personal supervision of Mr. J. SHEA, with the aid of the thermometer and dynamometer.

Experimental wires were first erected at Bermondsey by Mr. APPLEBY, of the southern division of London; and a large number of tests were made thereon by Mr. COOTE, the resulting sags being taken by a measuring rod from a fixed datum. These tests were supplemented by a series of investigations carried out at Head Office by Mr. GALL, Mr. COOTE and the writer.

Three sites in exposed positions were subsequently selected at (1) Wavertree, near Liverpool, (2) Meadswood, near Leeds, and (3) Corbar Hill, near Buxton.

At each of these places three poles were erected so as to give adjacent spans of 50 yards and 100 yards respectively, the poles being well stayed, and the cross-arms fixed in a horizontal straight line. The work at these places was carried out, and periodical observations made, by Mr. ROWE and Inspector PARKER, of Liverpool, Mr. LALLEY and Inspector BIRKBY, of Leeds, and Mr. BOWES, of Oldham, respectively.

And here I desire to place on record my keen sense of appreciation of the zealous co-operation of all the above-named gentlemen, who thoroughly entered into the spirit of the investigation and made it a veritable labour of love.

The outcome of the experiments so far made appears to point to the eventual adoption of a factor of safety of 2·5 at 10° F. for both bronze and hard-drawn copper, and the two tables here appended in which elasticity is taken into account are based upon this assumption.

TABLE 1.

100 lbs. H.D. Copper.—Mean Tensions and Corresponding Sags.

Temp. F.	Tension. lbs.	50 yds. inches.	60 yds. inches.	70 yds. inches.	80 yds. inches.	90 yds. inches.	100 yds. inches.
10	135·0	4·7	6·8	9·3	12·1	15·4	18·9
15	131·5	4·9	7·0	9·5	12·4	15·8	19·4
20	128·0	5·0	7·2	9·8	12·8	16 2	19·9
25	124·5	5·1	7·4	10·1	13·1	16·6	20·5
30	121·0	5·3	7·6	10·4	13·5	17·1	21·1
35	117·5	5·4	7·8	10·7	13·9	17·6	21·7
40	114·0	5·6	8·1	11·0	14·3	18·2	22·4
45	111·0	5·8	8·3	11·3	14·7	18·7	23·0
50	107·5	5·9	8·5	11·6	15·2	19·3	23·7
55	104·0	6·1	8·8	12·0	15·7	19·9	24·5
60	100·5	6·3	9·1	12·4	16·3	20·6	25·4
65	97·5	6·6	9·4	12·8	16·8	21·2	26·2
70	94·5	6·8	9·7	13·3	17·3	21·9	27·1
75	91·0	7·0	10·1	13·8	18·0	22·8	28·1
80	88·0	7·3	10·5	14·3	18·6	23·7	29·1
85	84·5	7·6	10·9	14·8	19·3	24·5	30·3
90	81·5	7·9	11·3	15·4	20·1	25·4	31·4
95	78·5	8·2	11·7	16·0	20·8	26·4	32·6
100	76·0	8·4	12·1	16·5	21·5	27·3	33·7

TABLE 2.

40 lbs. Bronze.—Mean Tensions and Corresponding Sags.

Temp. F.	Tension. lbs.	50 yds. inches.	60 yds. inches.	70 yds. inches.	80 yds. inches.	90 yds. inches.	100 yds. inches.
10	80·0	3·2	4·6	6·3	8·2	10·4	12·8
15	78·4	3 3	4·7	6·4	8·3	10·6	13·0
20	76·8	3·3	4·8	6·5	8 5	10·8	13·3
25	75·3	3·4	4·9	6·6	8·7	11·0	13·6
30	73·8	3·5	5 0	6·8	8·9	11·2	13·9
35	72·3	3·5	5·1	6·9	9·0	11·5	14·2
40	70·8	3·6	5·2	7·1	9·2	11·8	14·5
45	69·3	3·7	5·3	7·2	9·4	12·0	14·8
50	67·8	3·8	5·4	7·4	9·6	12·2	15·1
55	66·2	3·9	5·6	7·6	9·8	12·5	15·5
60	64·8	3·9	5·7	7·7	10·1	12·8	15·8
65	63·3	4·0	5·8	7·9	10·3	13·1	16·2
70	61·6	4·1	6·0	8·1	10·6	13·5	16·6
75	60·0	4·3	6·1	8·3	10·9	13·8	17·1
80	58·5	4·4	6·3	8·6	11·2	14·2	17·5
85	57·0	4·5	6·5	8·8	11·5	14·6	17·9
90	55·6	4·6	6·6	9·0	11·8	14·9	18·4
95	54·3	4·7	6·8	9·2	12·1	15·3	18·8
100	52·8	4·8	7·0	9·5	12·4	15·7	19·3

Two points may be mentioned regarding the above tables:—(*a*) that the tension for either wire may be regarded as independent of the length of the span, (*b*) that in regulating one would not measure to tenths of an inch although shown in the sags, but pull up to the required tension.

In concluding this article, I may mention that the experimental wires at Liverpool, Leeds and Buxton will be maintained and periodically observed during the coming winter, and I hope to give the definite conclusions next spring.

FOREIGN INTELLIGENCE.

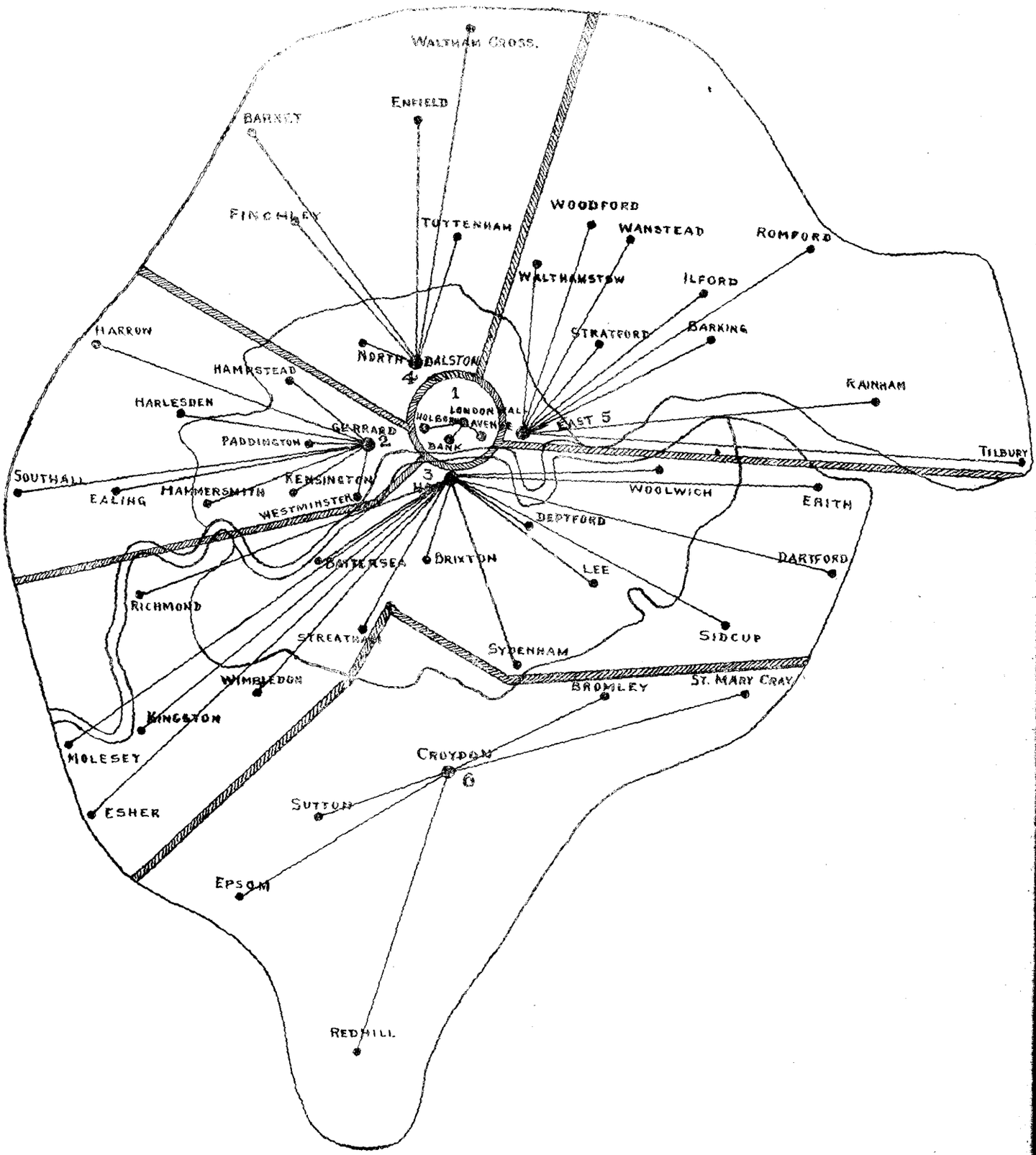
Denmark.—We have received the "Statistical Review" of the Danish Telegraph system showing the figures at the close of the financial year 1905-6. The length of the subscribers' lines was 202,000 kilometers in all of which 193,000 were owned by private Companies. The subscribers to the State system were 632, to the Companies' systems, 47,718. The number of trunk conversations from the Company's subscribers was 6,167,500, and of local conversations about 101,769,200. The Copenhagen Telephone Company had 28,464 subscribers, the Funen Communal Company, 3,960, and the Jutland Company, 9,192. The number of stations in the principal towns is as follows:—Copenhagen, 22,159; Aarhuus, 2,533; Aalborg, 1,888; Odense, 1,438; Randers, 1,066.

FITTING DEPARTMENT.

The numbers on the Chart are shown against the Centre where the Chief is located.

All the points to which lines radiate come within each Chief's District.

The outer boundary is that of the London Telephone Area; the inner that of the County of London.



LONDON INSTRUMENT FITTING.

By A. C. GREENING, *Chief Fitter.*

THE figures and details relative to Glasgow instrument fitting which appeared in the July JOURNAL doubtless interested all engaged in this class of work, although to appreciate them fully, or to use them as comparisons, one necessarily wants to know something about local conditions, such as area and facilities for travel.

Throughout the Metropolitan area recognition is given to the necessity for rapid completion of works orders, more particularly revenue-earners, it being obvious even to the man behind the hammer that the more speedily a piece of apparatus is brought into use the sooner it begins to earn money for its owners, and to bring in some return for the labour he has personally bestowed upon it.

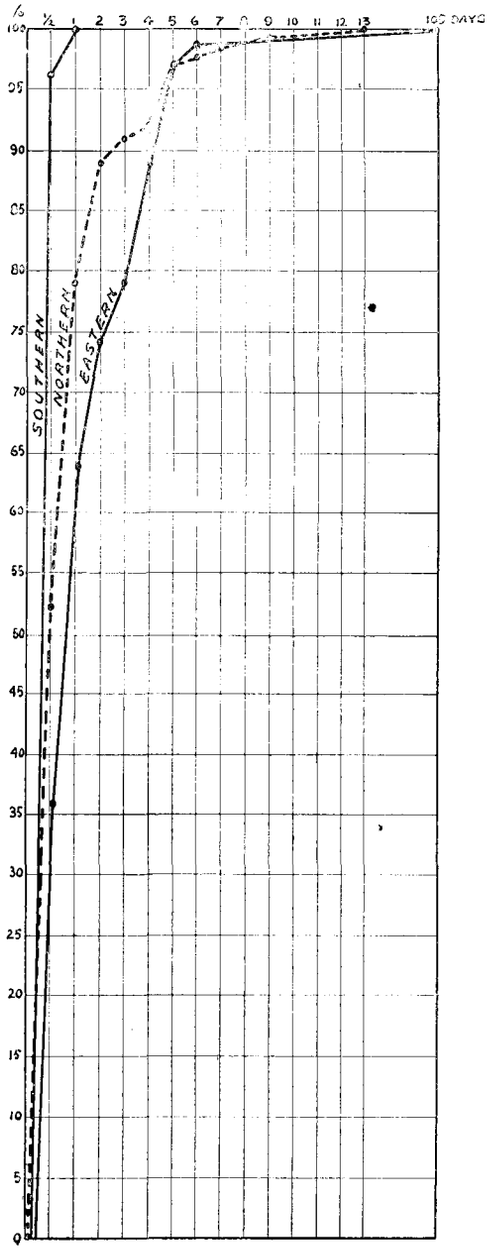
To provide a "time gauge" and stimulate individual effort, a monthly curve is prepared for each "fitting centre," showing what percentage of revenue-earning works orders is completed within one half-day, one day, two days and so on, such periods being calculated from the time a works order is received from the issuing office, or, in the case of a new line, from the engineer, to the time the fitter returns it completed.

For fitting purposes the metropolis is divided into five districts, each with its divisional chief. Chart I. gives these districts in detail, the centre at which each chief is located being clearly defined. All the points to which lines radiate come within the chief's district. A comparison with a map of the County of London drawn to scale will give the area of each division. The Croydon section, while large in area, is comparatively insignificant from a fitting point of view, and the interests of the department are looked after by the divisional maintenance electrician. All points recorded upon the map are readily reached from their respective centres by means of rail, car, 'bus, or tube.

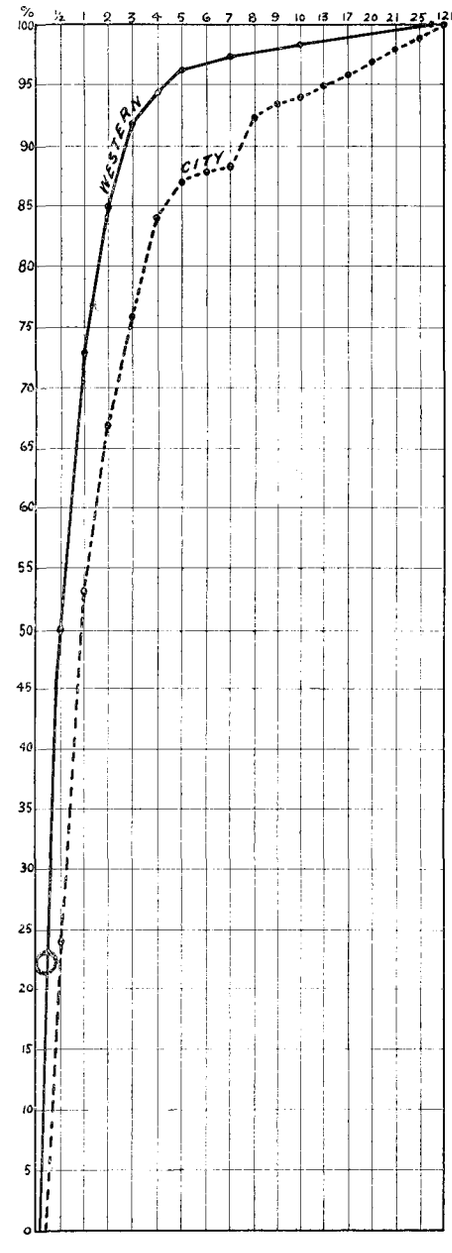
METROPOLITAN FITTING DEPARTMENT.

Time taken to complete Works Orders during the Month.

JUNE - 1906.



DISTRICT.	No OF W/Os	AVERAGE TIME TAKEN TO COMPLETE
SOUTHERN DISTRICT	182	" DAYS 12 Hrs 27 Mins
NORTHERN "	127	1 " 5 " " "
WESTERN "	247	2 " 1 " 32 "
CITY "	254	3 " 10 " 5 "
EASTERN "	39	4 " 9 " " "



The divisional officer is naturally keen to occupy a good position upon the curve chart, and while there are many things connected with instrument fitting outside his control, the quality of his curve is to a considerable extent dependent upon the way he handles his staff.

Charts II. and III. give the various fitting curves for June 1906, and it must be noted they show works orders, not instruments. A recent investigation showed the average number of instruments per works order at 1·3.

The *average* time taken to complete a works order is of little importance, as this is influenced by the possible unreadiness of a subscriber to take up the service or extension of service. Percentages of works orders completed within the half-day and day *are* valuable however, and a series of curves affords excellent data from which to estimate the capabilities of a divisional staff.

The time charts require few explanatory remarks. Speaking generally, the small percentage of works orders still in hand after two days owe their incompleteness either to the magnitude of the installation covered by the works order, or to unpreparedness on the part of subscribers. Thus the 103 and 121 day's limit on the charts were both due to subscriber delays.

The Glasgow Chief Electrician asks for experiences relative to sub-stores.

Stores are located at all centres indicated upon Chart I., but instruments and their more common accessories are procurable at certain other points. A fitter is thus enabled, by equipping himself at a sub-store near his residence, to begin his day's work in the locality right away, or, having booked on at the centre for his first job, to draw material for his next from the most convenient sub-centre.

A scheme of apparatus delivery by public carrier has been tried, and found wanting, in that instruments despatched to-day fail to reach their destination prior to the day after to-morrow, and not always then, causing futile calls and retarding fitting generally. The delivery companies were not keen on collecting empty cases nor subscribers on storing them. The judicious employment of a light van materially assists, especially where the bringing into use of a new route or cable entails considerable fitting work within a limited area, and a few fitters can pass rapidly from point to point unhampered by *impedimenta* other than a tool kit. The use of a van may, however, be safely left to the discreet generalship of an officer with a curve to maintain.

SYSTEMATIC DEVELOPMENT STUDY.

By A. B. GILBERT.

UP to within quite recent times the question of development has received but little attention. We were quite content to know that our business was developing and would continue to do so, but to what extent, or at what rate, we did not consider very seriously. I think one may assert that this important question deserves the most careful thought and consideration.

The study of development consists of two main questions. First, how many telephones may be expected within a given period? Second, at what rate will these telephones be placed? Density and rate of growth are the two main features, but from the general engineering standpoint there are other important questions to be answered; such as, where the telephones will be located, the class of service these telephones will represent, the probable rate of calling and the destination of the calls. It is proposed here to consider density, rate of growth, and location of telephones.

It would seem that the contract department is the proper one to carry out the study, and one man should be selected to compile the necessary particulars.

The question of rates has a very important bearing on development, and it is safe to say that the higher the rates the less the density, and conversely the lower the rates the greater the density. One may remark, however, that the question of rates does not concern the development to the same extent when viewed for a long period, say, from ten to twenty years, because it is fair to assume that time alone will bring development. However, taking a period of, say, six to eight years the question of rates must largely influence the development. Of course the rate question is one for the higher management, but given an idea of the probable rates we may consider a study.

The first thing to be done is to plot on 25-inch plans the existing stations by means of a distinctive code, indicating the various classes of service. To plot correctly requires a man's whole attention, and demands that he shall know thoroughly well the whole town or area. From time to time he should verify his plottings, and all particulars being taken systematically from the instrument cards, he would find the gradual building up of his plans very fascinating.

After plotting the stations as existing at a fixed date, it is suggested that a table be prepared on the lines of Table 1, and that this should be used to classify all the properties and localities of the town. It is very important to designate vacant or spare ground which probably will be built upon during the period that the study is taken for. From enquiries made in the locality it will be found possible to arrive at something fairly representative of what will actually exist at the end of the period.

TABLE 1.

(To show property in accordance with the following classification.)

"A" CLASS:
Business.—First-class offices, works, warehouses and shops.
Residence.—First-class, say, £60 rent and over.

"B" CLASS:
Business.—Medium-class offices, small works, medium-class shops.
Residence.—Good-class villas, say, £40 to £60 rent.

"C" CLASS:
Business.—Third-class premises of any kind.
Residence.—Small villas, say, £25 to £40 rent.

Note.—Large buildings, such as large stores, large hotels, etc., might be designated as "A A" Class in view of private branch exchange work.

The next step suggested is to make a survey of the town, to mark a plan with code letters in accordance with Table 1, and also with a figure representing the number of offices, places of business, private houses, etc. This should be done in natural blocks as far as possible, and it is desirable to keep the units reasonably small.

Before the particulars collected are plotted on the development plans, it is suggested that a second table, showing what may be termed the "telephonic expectancy" in the various classes, be prepared on the lines of Table 2.

TABLE 2.

(Percentage of businesses or residences = probable proportion of subscribers.)

"A" CLASS:	*Business.*—100	per cent.
	Residence.—90	,,
"B" CLASS:	*Business.*—100	,,
	Residence.—70	,,
"C" CLASS:	*Business.*— 20	,,
	Residence.— 13	,,

It is assumed that we are making a study for an eight-years' period, and the question to be answered is, taking the probable rates, what percentage of the various classes may we reasonably expect to take the service? The table should be constructed to meet the local circumstances—the one given is merely an idea of what may be expected to occur in a large and prosperous town. Taking the particulars collected from the survey and using Table 2, we could then proceed to fill in the development plans. We should then have plans showing the existing "stations," the class of property and the total number of subscribers (not stations) expected and their location.

A further table is now required in order to arrive at the number of "lines" expected. I give a table (No. 3), which is one supposed to apply to an eight-years' study in a large town. This table would be used to convert the calculated probable number of subscribers (not stations) into "lines" expected.

TABLE 3.

(Percentage of subscribers = number of lines.)

"A" CLASS:	*Business.*— 110	per cent. to 120 per cent.
	Residence.—100	per cent.
"B" CLASS:	*Business.*— 100	,,
	Residence.— 90	,,
"C" CLASS:	*Business.*— 50	,,
	Residence.— 60	,,

Note.—A special percentage should be taken for "A A" Class, representing private branch exchanges, according to circumstances.

Thus far I have endeavoured to outline a method whereby for a given period we may find the development in "lines." At the same time the questions of density and location of lines have been answered.

The rate of growth can be found in the following way :—The plotting of existing subscribers gives the number of lines at present, and the calculated development gives the total lines for eight years. We then have two sets of figures, and we can find, from the geometrical increase table, a figure which, when used as a multiplier, will raise present lines to ultimate lines. The percentage figure found represents the increase for each year that we must give to our present lines to provide for the development decided upon. It is recognised that this percentage increase may or may not correspond to the mean percentage increase of the last few years, but it is suggested that we are more likely to be near the mark by predicting the percentage of the various classes likely to take the service than by assuming that a certain percentage of general increase can be looked for. The resulting percentage to population can of course be used as a check on the method outlined. It is suggested that we are safer in working on these lines than on the lines generally in vogue at present; if this be true, we ought to assume some specific density for each of the various classes in order to arrive at the probable increase.

Again, in favour of the method outlined and against the practice of considering development merely in relation to total population, it is suggested that the lay-out of the stations in the latter method is based upon a general multiplier for the whole area but is applied to numerous individual areas or districts of very varying conditions. This method seems clumsy and not calculated to secure accuracy; we have at present very uneven development in areas of the same class, which organised canvassing will gradually correct.

After finding the mean percentage increase that will raise the present lines to the ultimate lines for the period, it is interesting to note that we can assume different rates of growth for the various years, if we so desire, which for the whole period will give the mean percentage increase.

The question of development in stations does not appear to be of great moment, because apart from private branch exchange work it does not affect the fixed or substantial line-plant to be provided. However, given the "lines" it is possible to calculate fairly closely the probable number of stations.

In conclusion I would remark that the plans with the plotted subscribers provide a graphic indicator for the contract department, which would prove of immense value, inasmuch as the thinly developed parts of the town are at once made clear, and it is suggested that the cost of preparing such plans would very soon be made good.

HIC ET UBIQUE.

THE NATIONAL TELEPHONE JOURNAL now finds its way into most civilised lands. Amongst the foreign and colonial cities in which we have subscribers are Antwerp, Albany (N.Y.), Berlin, Boston, Baltimore, Berne, Brussels, Bombay, Cologne, Cairo, Chicago, Calcutta, Cincinnati, Denver (Col.), Dallas (Texas), Detroit, Hong Kong, The Hague, Indianapolis, Lisbon, Melbourne, Mexico, Malta, Minneapolis, New York, Nashville (Tenn.), Paris, Philadelphia, Rangoon, Rotterdam, St. Petersburg, Stockholm, Singapore, and Vienna.

ONE or two provincial papers in quoting the story of Boskins and his "two-one-double-oh," which appeared in our October number, have thought it necessary to prefix the following delightful explanatory remark. "There is a regulation under which telephone girls have to repeat the numbers of subscribers in a form different to that adopted by the subscriber who asks for the call." This is surely a noble specimen of *a posteriori* reasoning.

T. ELLIOT, Chief Clerk in the Company's Galashiels office, had the honour of captaining the South of Scotland Football team against the famous South African combination in the match at Hawick on Tuesday, Nov. 13.

SYLLABUS OF TELEPHONE SOCIETIES, SEASON, 1906-7.—*Continued.*

BRIGHTON.

Nov. 12.—Junction Working on Common Battery Systems. F. W. TAYLOR.
Nov. 12. — Transmission. B. S. COHEN.
Dec. 3.—Operating—the Cardinal Points. S. J. PHARO.
Dec. 17.—Underground Construction. H. LEGGE.
Jan. 7.—Secondary Batteries. W. GOULDEN.
Jan. 26.—Knotty Points. General Discussion.
Feb. 4.—Testing Instruments and their uses. P. C. LANGRIDGE.
Feb. 18. — Motors and Dynamos. F. W. ROBERTS.
Mar. 4.—Common Battery Extensions. H. HATTON.
Mar. 18.—Construction of Aerial Routes. W. KNIGHT.
April 1.—Theory and Practice. W. GOULDEN.
April 15. — Underground Schemes and Development. F. W. TAYLOR.
Course of Practical Lectures for Advanced Staff on Common Battery Exchange Equipment, on advertised dates. W. GOULDEN.

LIVERPOOL.

Oct. 18. — Discussion on Current Number of TELEPHONE JOURNAL.
Nov. 15. — Telephone Instruments. J. PARRY.
Dec. 20.—Economical Construction. J. M. SHACKLETON.
Jan. 17.—Common Battery Working. W. M. FRANCE.
Feb. 21.—Power and its Application to Telephony. J. O. COOPER.
Mar. 21.—Emergency Organisation. C. S. WOLSTENHOLME.
April 18.—Operating Matters. — FERGUSON.

LONDON, SOUTHERN.

Nov. .—*Common Battery Instrument Faults.* F. WATT.
Dec. .—Wiring of Hotels, Blocks of Buildings, etc. B. DAVIS.
Jan. .—The Silvertown Test Set. B. JOHNSON.
Feb. .—Accumulators. G. BRYANT.
Mar. .—Common Battery Circuits —Subscribers. F. HAYDEN.
April .—Common Battery Exchange Faults. F. M. WARD.
May .—Instrument Faults. Messrs. SCOTT, CASELEY, COUPLAND and BAXTER.
June .—Sound. P. J. RIDD.

OLDHAM.

Oct. 18.—Secondary Batteries. W. B. CHEETHAM.
Nov. 1.—Lock-out Party Line System. R. MOULT.
Nov. 22.—The Business Side. W. LEE and M. PINDER.
Dec. 13.—Generation of Power. C. H. BAKE.
Jan 10.—Central Station Working. W. LEEMING.
Jan. 31.—Electric Light and Power Distribution. W. B. CHEETHAM.
Feb. 21.—Underground Construction. T. S. BOWES.
Mar. 14.—Transmission. W. CROMPTON.
Mar. 28.—General Meeting.

MANCHESTER.

Oct. 26.—Covered Distribution. A. MAGNALL.
Nov. 9.—Telephony on the Continent of Europe. H. LAWS WEBB.
Nov. 23.—Economical Construction. J. M. SHACKLETON.
Dec. 7.—Electric Light and Power Distribution. W. B. CHEETHAM
Jan. 11. — Junction Traffic. G. F STAITE.
Jan. 25.—The Use of Squared Paper. J. SCOTT.
Contract Department Working. H. ELLIOTT.
Feb. 8.—Prospect and Retrospect of Telephony. T. A. PROUT.
Feb. 22.—Members' Night. (Prize for best Paper.)
Mar. 8.—Transmission Measurements. B. S. COHEN.
Mar. 22.—General Meeting.

BIRMINGHAM.

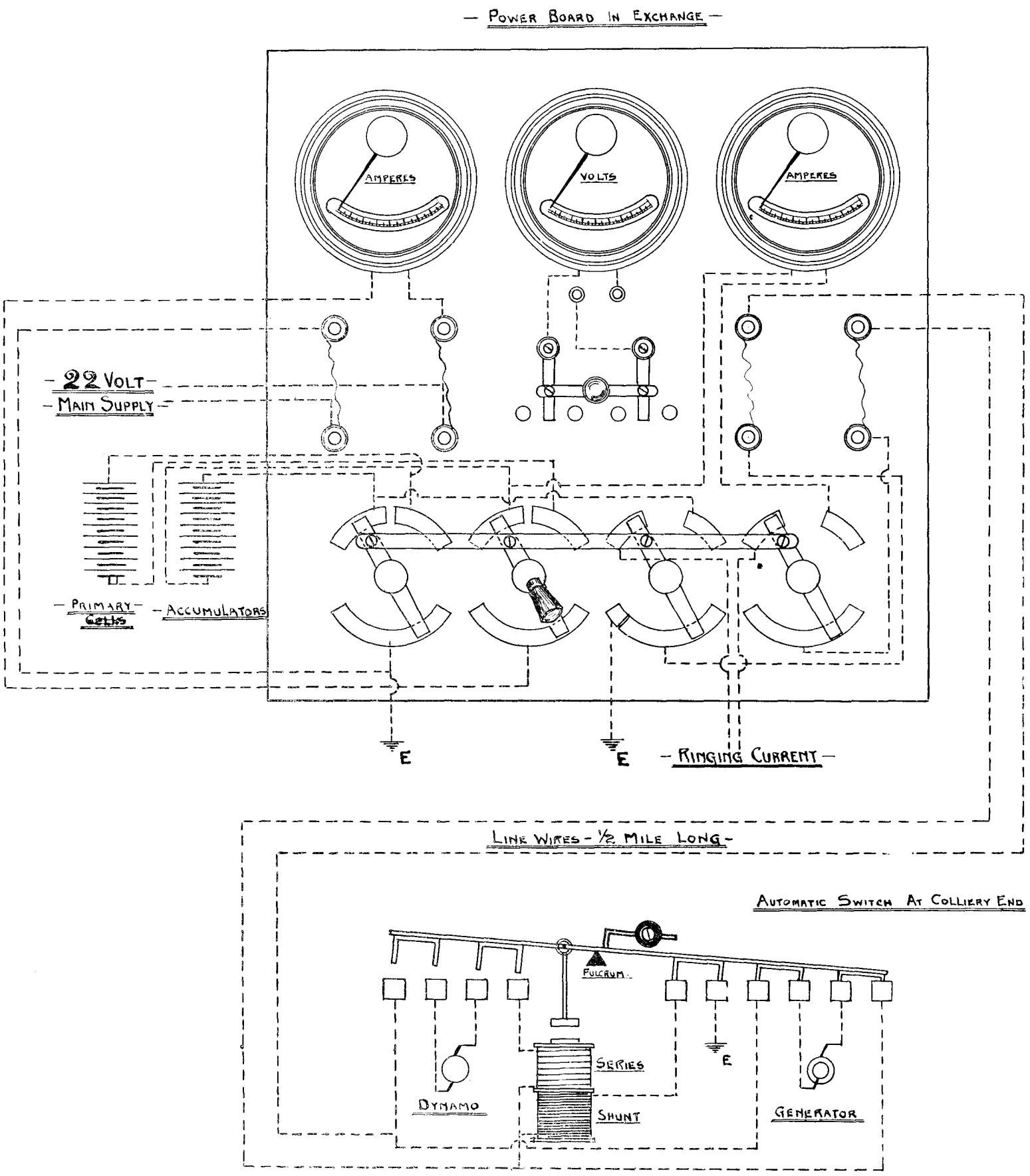
Nov. 2.—My American Trips. F. GILL.
Dec. 6.—Telephony on the Continent of Europe. H. LAWS WEBB.
Jan. 4. — Engineering Economies. J. M. SHACKLETON.
Feb 1.—Transmission Experiments. B. S. COHEN.
Mar. 1.—Underground Cables. F. C. G. BALDWIN.
April 5. — How the Company's Business can be Increased by the Staff. H. J. MACLURE.

PLYMOUTH.

Oct. 3.—The President's Address—Some Phases of Telephone Work. R. A. DALZELL.
Oct. 23.—Construction of Overhead and Underground Lines. A. R. WRAN.
Nov. 13.—Central Battery Working. W. E. WALTON.
Dec. 4.—Faults. H. W. ROBERTS.
Jan. 8.—Exchange Organisation. P. F. CURRALL.
Jan. 29.—Elementary Mechanics, and its Application to Line Construction. H. S. DISTIN.
Feb. 19.—The Business of Telephony. T. P. BOWEN.
Mar. 12.—Private Branch Working. A. E. BALL.

SHEFFIELD.

Oct. 17.—The President's Address. R. C. BENNETT.
What the Telephone said. W. THYNE.
Wayleave Reflections. W. PARFITT.
Nov. 14.—Lantern Evening. (Slides contributed by Mr. F. G. C. BALDWIN, A.I.E.E., and other members.)
Dec. 12.—Central Battery Working. J. HYDE.
Jan. 16.—Prize Papers. (Junior Division.)
Feb. .—Social Evening. (Date to be announced when arranged.)
Feb. 20.—Service Inspecting. S. B. TOWNSEND.
Debate (subject to be announced later), introduced by S. B. TOWNSEND.
Mar. 20.—Prize Papers. (Senior Division.)
Mr. W. A. SKINNER will have a Paper in reserve.



GENERAL ARRANGEMENT OF AUTOMATIC CHARGING APPARATUS

AS NOW WORKING IN GLASGOW

A NOVEL POWER PLANT.

BY THOS. PETTIGREW, *Glasgow.*

IN small outlying sub-exchanges where accumulators are necessary for visual signalling, if an electricity supply be not available, it is often a matter of some difficulty to provide the necessary power. The usual method is to use *T 11* type E.P.S. or Hart portable cells, carting them to and from a central exchange where the spare set can be charged up and made ready to go out again. When the distance between the exchanges is considerable, say four to six miles, the maintenance costs become excessive, principally due to the carting charges. The cells suffer through jolting, the paste being dislodged and shaken out of the plates, thus gradually reducing the capacity of the cells and shortening their life.

At Cambuslang, a sub-exchange near Glasgow, we had to face a difficulty of this kind, and when the estimated working costs came to be reckoned up, it was found that they were very high, approximating to £15 per annum.

We got permission from a colliery manager to fit a magneto generator in the dynamo-room at the colliery some distance from the exchange, and seeing the dynamo there, the idea was suggested of using the lighting supply for charging the accumulators in the exchange, making use of the ringing wires as power leads. The outcome of this was that the following apparatus was designed and, after obtaining Head Office sanction, was fitted and brought into use some three years ago. During three years' service the apparatus has given no trouble, although we have had the usual and seemingly inevitable troubles with generator belts through breakage, slipping, or rotting.

Diagram 1 shows the complete arrangement.

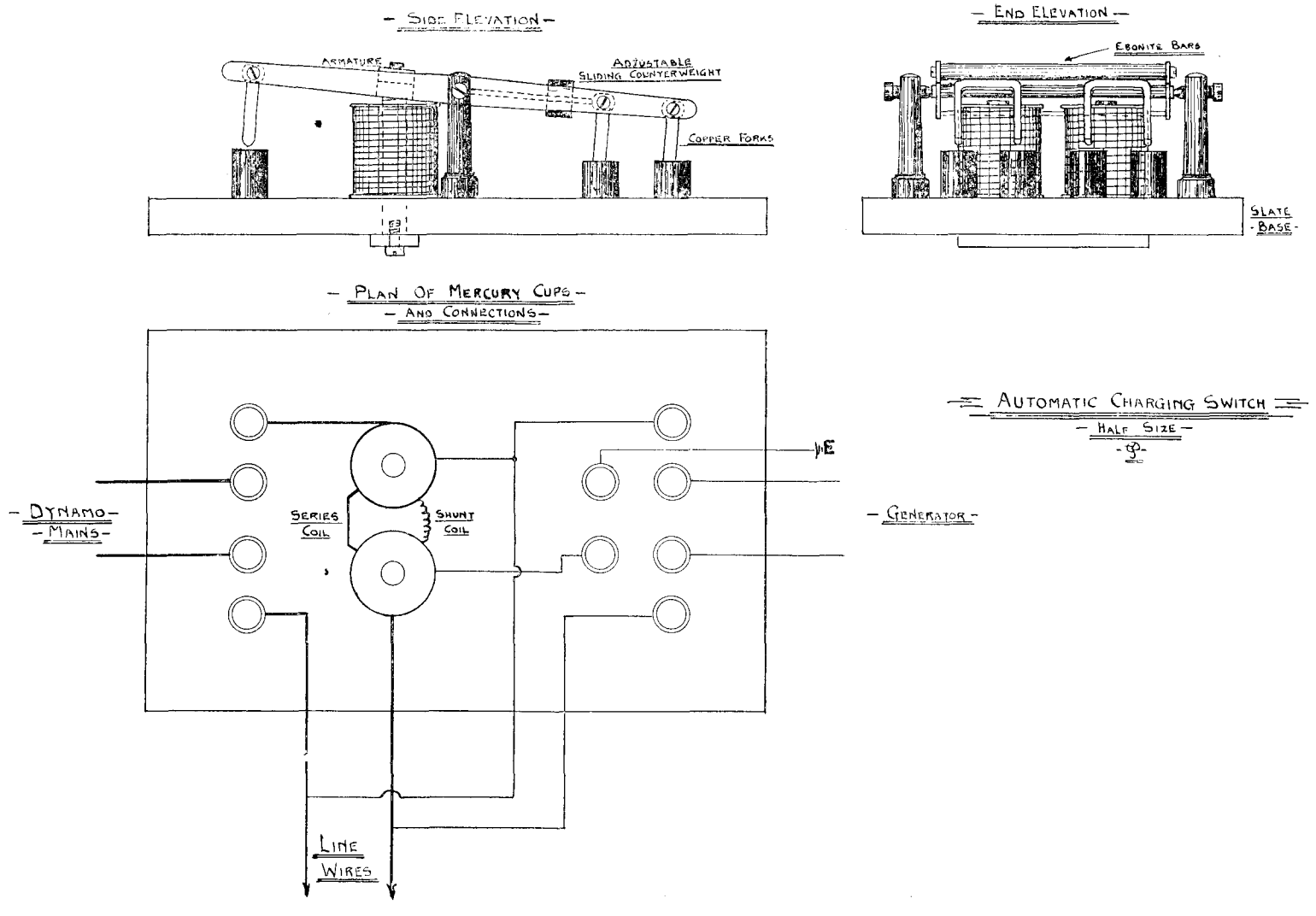
A power board is fitted in the exchange carrying the usual measuring instruments, fuses, etc., and a special switch arrangement. Four 2-way single-pole switches are fitted, coupled together by one handle, so that all are moved at once. The two left-hand switches control the discharge circuit, and it will be noticed from the diagram that the switch can be moved from one side to the other without disconnecting the exchange, so preventing clearing signals being given when changing over. The two right-hand switches control the charging and ringing currents. The second switch from the right is fitted with an extra contact block, which is earthed (see Diagram 1). This contact is used to switch on the power current at the colliery, which operation is performed by a specially designed automatic switch. Diagram 2 shows the general design and arrangement of this piece of apparatus.

AUTOMATIC SWITCH.

This consists of a slate base carrying ten mercury cups, an electro-magnet with two windings, shunt and series, and two pillars, supporting between steel centres a light beam on which are mounted four ebonite bars. These bars carry the connecting copper forks which dip into the mercury cups. An adjustable counter-balance weight is fitted for restoring the switch to its normal position when charging is finished. One side of the shunt coil is connected to line, the other being connected to a mercury cup which, when the beam is in the normal position, is earthed. The connections of the switch are shown in Diagram 1, where the switch is in normal position, the generator sending ringing current through mercury cups to the line, then through power board to translator.

CHARGING.

Charging is done some time after 6 p.m. as the traffic is then



very light and the primary battery can take the load quite comfortably. The charging operations are performed as follows :—

The four-pole switch is moved over to the charging side thereby—

(1) Taking the accumulators off the exchange, and substituting the primary battery.

(2) Taking the ringing current off the exchange, and connecting the line wires on to the accumulators through ammeter, switches and fuses.

All is now ready for switching on the power current. This is done by moving the 4-pole switch round until the switch blade of the second switch from the right touches the earthed contact, when the accumulators send a current, starting at colliery end, from earth through actuating or shunt coil over line through power board back to battery.

The electro-magnet is energised and the switch beam is pulled down, thereby—

(1) Cutting the generator off the line.

(2) Cutting the *earth* off the line.

(3) Connecting the dynamo *through the series coil* to line.

The series coil holds the beam in the charging position until it is released by the current being interrupted in the exchange.

As soon as the operator in the exchange sees the ammeter needle swing over, indicating that the current has been switched on, he moves the switch blade clear of the earthed contact block, and the cells are left to charge as long as may be necessary to bring the voltage and specific gravity up to their proper values.

To switch off, the handle of the 4-pole switch is simply thrown over to the normal position, thereby—

(1) Changing over the accumulators from charging to discharging position.

(2) Coupling the line on to the ringing leads.

The series coil on the automatic switch lets go at the same moment as the charging current is switched off in the exchange, and the counter-balance tilts over the beam to its normal position, cutting off the dynamo and connecting the ringing machine to line, at the same time earthing one side of the striking or shunt coil, so "setting" the switch in position ready for the next time charging current is required.

The automatic switch, which is perhaps the most interesting feature in this arrangement, was made in the exchange mechanic's shop at Glasgow.

The voltage at the dynamo terminals is 250, and the line resistance is such that we get about nine amperes through the cells. A small rental is paid for the facility.

The scheme just outlined may be of use in some of the outlying districts in other parts of the country, and it is in the hope that this may be so that this article has been prepared.

THE RECONSTRUCTION OF THE BERLIN TELEPHONE SYSTEM.

Translated by W. H. GUNSTON.

THE telephone service in Berlin is undergoing an important change, no less than the reconstruction of the whole plant—local, junction, and trunk. Hitherto almost every exchange has worked on a different system. Some exchanges were single, and others double-cord; some were fitted with glow-lamp signals, and others with drop-indicators; some were on the earth-circuit, and some on the metallic-circuit principle; in one district central battery talking was introduced some time ago, but in the others the magneto system has been maintained.

These different systems naturally required different handling of the apparatus both at the exchange and at the subscriber's telephone, and variations arose, with anything but satisfactory effect, in all connections between exchanges with different systems. For example, to determine whether a conversation were finished and the line to be disconnected, the operators had to distinguish in each case between like and unlike connections. A subscriber with a central battery instrument could not ring a subscriber with a magneto-generator, and *vice versa*. Neither could a subscriber to an exchange with visual signalling ring a subscriber on a drop-indicator exchange. Thus the operators were obliged to supervise some connections much more than others.

(It must be remembered that in the Berlin system which is now being superseded a subscriber desiring connection with a subscriber on another exchange is required to ask first for connection to that exchange, and then to ask for the subscriber he wants, and when connected to ring him.)

As the method of working was continually changing there arose a confusion which influenced perceptibly the efficiency of the service.

The *Zeitschrift für Post und Telegraphie*, from which the particulars in this article are taken, describes in the following paragraph the evolutionary process through which the telephone art has passed, a subject with which British telephone men are familiar—the constant supersession of plant by further improvements and inventions, the unending reconstructions and rebuildings, the consequent sacrifice of money, and the final attainment of a system of more or less uniformity.

The cause of this multiformity of the Berlin system is to be found in the rapid and general development of telephony and in the application of the different phases of this development to practical work. In their efforts to fit exchanges with ever more perfect apparatus, the German administration utilised all occasions which offered for the improvement of the original exchanges. Such occasions arose, for example, when the switchboard of an exchange required renewing after long use, or its capacity was reaching its end, so that a switchboard of greater size was necessary. In a telephone area such as Berlin, with several exchanges, of which perhaps only one required renewal, the question arose whether for the sake of uniformity the other exchanges should not be refitted also. That, however, would have required too great a sacrifice of money. Then, too, the system would for many years be shut out from further technical progress, or the administration would be committed to repeated alterations of all the exchanges for the introduction of improved systems brought out from time to time. By this means, however, rebuilding would become a permanent question, the costs would rise to immeasurable heights, and the desired unification of the system would be purchased at the expense of recurring, long-enduring periods of disturbed service. It is not as though one could have said with some right: "Now we have attained a system which cannot be surpassed within reasonable time, the troubles of rebuilding will be followed by years, perhaps centuries, of rest!" This state of things was still far off. There was a great bubbling and seething in the cauldron of telephony; now this and now that improvement came to the top, and in actual practice telephone engineers neither had a decided preference for a particular form of switchboard nor felt any certainty as to what was required of an ideal system. It was only left, therefore, to fit new exchanges, or those about to be altered, with the most progressive plant of the day, and to disregard the uniformity of the system. Thus Berlin acquired several different systems of exchange working.

The further development resolved itself into two sharply divided lines. On one side salvation was found in the perfection of the existing system with the retention of the electro-magnetic calling and clearing signals. On the other side efforts were made to obtain quite new effects by the introduction of the electric lamp signals. The latter had the victory; indeed, the glow lamp has been a revolutionising influence in telephone practice and telephone service. It replaced the existing indicators, spring signals, galvanoscopes and all other signals most completely. Its adoption created possibilities not thought of before. As it has no moveable parts it can be used in any position—vertical, horizontal, or inclined. It also permits the calling and clearing signals to be placed immediately contiguous to the jacks and cords (which was not before possible), so that the operator is spared the search for the corresponding jack or cord, and the working is thus accelerated.

The *Zeitschrift* gives a description of the working of a lamp signal common battery exchange, with which readers of the JOURNAL are sufficiently familiar.

The first glow-lamp switchboard was tried in North America, whence the invention sprang. European towns followed—Vienna first, with two exchanges of 12,000 lines each.* There are now central battery exchanges in most civilised countries, either working or in course of erection, and it seems unlikely that any other system will obtain in large areas. The German Telegraph Administration intends to instal this method of working in all exchanges of the larger and middle size. The change began in Berlin some years ago, and, although work is being carried on at high pressure, will not be finished before another two years. This length of time is partly due to the necessity of spreading the great cost over a number of years; besides which the enormous scope of the work would render a more rapid completion scarcely possible, for the rebuilding is not limited to the exchange equipment but comprises the whole network of wires, since the single wires hitherto used must be converted to metallic circuits, a result only attainable by their

* The Vienna switchboards are not common battery, but magneto with lamp signals, The first common battery exchanges in Europe were installed by the National Telephone Company in 1899.—ED. *N. T. J.*

transfer to an underground system. Exchanges I, II, III and IV have capacity for 20,000 lines each. Exchanges VI and VII for 25,000 and 14,000 respectively, so that the total capacity amounts to 119,000 subscribers' lines. At present the number of subscribers' lines in Berlin is roundly 50,000 and of extensions roundly 29,000, the percentage of extensions to lines, therefore, is about 58. It may, therefore, be estimated that the new Berlin exchanges will have capacity for about 188,000 stations.

The first exchange opened with complete common battery working was Charlottenburg on June 19 of this year, followed on June 29 by Exchange VI (Körner-strasse); and some weeks later Exchange VII and the Trunk Exchange were ready. Exchanges I, II, III and IV are still rebuilding. Not until the whole work is completed can the benefits of the new system be fully reaped. They include, chiefly, a service free from external troubles, exceptional clearness of speech, and the decline of line and instrument faults to a fraction of the present figure.

THE VANISHING MUNICIPAL TELEPHONES.

FROM THE *Electrical Review*.

LAST month the second of the municipal telephone systems to be sold to the Post Office, that of Brighton, was formally transferred, in exchange for a small cheque of £49,000. The lucky escape of the Brighton Town Council from its telephonic adventure was made the occasion of a short ceremony from which the note of mutual admiration common to such proceedings was conspicuously absent. Town councillors would not be true to their colours did they not keep up the policy of bluff to the last moment. At Brighton, within about a year, there have been three sensational Local Government Board inquiries on municipal trading ventures involving large expenditures of public money, which have revealed incapacity, ignorance and irresponsibility to an extent unusual even in municipal trading circles. Not the least sensational of these enquiries was that relating to the telephone business of the Brighton Corporation, and rather than face another such public exposure of business and technical incompetence, the leading spirits of the telephone committee, aided of course by the local M.P.'s, have been engaged for a long time past in strenuous endeavours to sell the telephone system to the Post Office.

These endeavours have been successful, and the Post Office buys at a handsome price a telephone system which, from the commercial point of view, has been thoroughly unsuccessful. To the astonished Post Office representative the Mayor of Brighton is reported to have said that the Government had, "so to speak, put a rope round our necks and strangled us." The Mayor is also reported to have made the following remarkable statement:—"He had every confidence in saying that the Postmaster-General was buying from the town a sound, genuine business, and had, moreover, made an exceedingly good bargain. But for the circumstances which had arisen, the Corporation would never have entertained the idea of selling the concern at the price now paid."

No doubt the municipal trading whole-hoggers, to borrow a Parliamentary phrase, who constitute one of the deep-seated causes of the financial troubles of the country, who make capital dear and labour cheap by pouring tens of millions annually into mismanaged and unsound undertakings, would like to indulge unchecked and uncontrolled in borrowing money on the security of the rates, that fatally easy process which has been so vastly abused during the past twenty years. And when the Local Government Board at last begins to make real instead of perfunctory inquiries and to put some check on municipal borrowing, it is perhaps pardonable poetic license on the part of the representative of a corporation which has indulged in a veritable orgie of borrowing to describe this wholesome process as "putting a rope round our necks and strangling us." As detached spectators of the evils which have arisen from the municipal trading craze, we can only heartily say—more power to the rope!

But when the Mayor of Brighton goes on to say that the Postmaster-General, in buying the Brighton municipal telephones, is buying a sound and genuine business and has made a good bargain, he is carrying the policy of bluff a little too far into the realms of the ethereal. It is well known that the Brighton municipal telephone business is a stationary one, and that its finances are thoroughly unsound. The very small business established—about 2,000 telephones in a total population of nearly 200,000—has only been secured by dint of strenuous canvassing by the whole Corporation, and by the exercise of all the pressure a trading town council can bring to bear, in devious ways, on individual tradesmen; while the management of the concern as a whole, as revealed at the Local Government Board inquiries, has been a burlesque on business methods. What the Postmaster-General thinks of his "bargain" is revealed by his official circular, in which he says that the rates are unremunerative, and will have to be raised, and that he will have to reconstruct the exchange (only four years old) with up-to-date equipment.

THE WIRELESS TELEPHONE PROBLEM.

THE Berlin correspondent of the *Times'* Engineering Supplement gives the following account of the work of Dr. RUHMER, the well-known experimenter in wireless telephony:—

Many efforts have been made in recent years to obtain wireless transmission of the human voice by processes resembling the methods used in wireless telegraphy. The principal reason why previous attempts have failed to yield a solution of this problem was the impossibility of producing electric waves of constant amplitude. This has, however, been quite recently achieved by Valdemar Poulsen, the inventor of the telegraphone, concerning whose successful experiments the technical Press has lately contained some information. It will be remembered that Poulsen produces undamped electric oscillations of great intensity with the aid of what is called a "singing arc" by enclosing the latter in an atmosphere of hydrogen. The results obtained by the Danish inventor have just been recorded by Mr. E. Ruhmer, of Berlin, the well-known experimenter in the field of wireless optical telephony, who has submitted an account of his first experiments to the members of the conference on wireless telegraphy which is being held at Berlin.

It should be remembered that there are two possibilities of interfering with electric vibrations by the agency of the human voice, according to whether their intensity or their wave length is influenced in a manner corresponding to the sound waves. In both cases electric waves undulating in agreement with the sound waves will be produced, their frequency being either constant or variable. The wave detector arranged at the receiving station in series with a telephone and battery will have to be employed in a manner analogous to what is done in wireless telegraphy. In the case of constant wave lengths an alteration in the intensity of the wave will result in a corresponding change in the effect exerted on the receiver, while with different wave lengths a variable number of waves during equal intervals of time will act on the receiver.

Mr. Ruhmer employs a sending apparatus, arranged according to Poulsen, which comprises a "singing arc" placed in a hydrogen atmosphere and fed with direct current at 220 volts. The vibratory circuit is constituted by a condenser consisting of seven Leyden jars, an adjustable induction coil, and the primary coil of a Tesla transformer, when a high tension flaming arc several centimetres in length, in the case of a convenient tuning, may be maintained between the secondary terminals of the transformer. This electric arc, on being examined in a rotating mirror, was found to have the appearance of a continuous current arc, its frequency (about 300,000 periods per second) being far too high to permit of its decomposition into individual spark discharges. An oscillograph glow tube inserted in the secondary circuit of the transformer showed, in the rotating mirror, a uniform glowing surface, limited by two straight lines parallel to the line of zero, and situated at equal distances from the latter. This oscillograph glow tube also enables the influence exerted on the intensity of the undamped electric oscillations by the distance of the electrodes of the wave generator, as well as by the intensity of the feeding current, to be recognised by the deflection of the glow.

This observation induced Mr. Ruhmer to alter the generator of waves in the same way as a speaking arc lamp. The choking coil previously inserted in the feeding circuit of the arc, intended to prevent any reaction of the rapid oscillations on the direct current circuit, was replaced by an induction coil, the secondary winding of which was connected to a microphone and battery. On talking into the microphone, the oscillograph glow tube was found to show a glowing band of variable luminous intensity, with depressions corresponding to the sound waves, showing the intensity of the high frequency currents in the secondary of the transformer to be influenced in a way which exactly corresponds to the spoken words. These effects seem to depend on alterations both in the wave length and in the intensity of the electric oscillations. When a flaming arc, in the place of the glow tube, was fed with the undulating high frequency currents this would distinctly reproduce any word spoken into the microphone with an intensity even superior to that of ordinary direct current "speaking" arcs.

Mr. Ruhmer then used a similar arrangement for transmitting the human voice with the aid of electric waves, an electrolytic cell serving as wave detector. Experiments so far made have been confined to the inventor's laboratory, and the results hitherto obtained over distances of about 30 metres, with the aid of an aerial wave 1½ metres in lenth, are considered to be highly satisfactory. These investigations are being continued with aerial wires of greater length, and it is hoped shortly to transmit conversations effectively to distances of several kilometres.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

Published Monthly at

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VOL. I.] DECEMBER, 1906. [No. 9.

METERS AND OTHER MATTERS.

ONE of the periodical newspaper discussions on the telephone service has been running its course in one or two of our popular contemporaries, consisting of complaints of a few subscribers—who have failed to recognise that however good a telephone service may be, individual causes of complaint are bound to arise—and the usual inaccurate and superficial remarks of the newspaper paragraph writer. The discussion started with the publication of the complaint of a Post-Office subscriber who alleged that he had been charged for more calls than he had sent; subsequent details published show that when the subscriber instituted a careful check on the use of the telephone, the Post Office making a similar check at the exchange, his count agreed exactly with that of the Post Office. This is taken as clear proof that the calls had been miscounted before, though obviously it might indicate that calls had been made before which had not been counted by the subscriber. The telephone in most establishments is accessible to a number of people, and in almost any establishment, except a single room with a single occupant, very special measures would be required to insure an absolutely accurate count of all calls made. But, as the dramatist of the day points out, so fond are Englishmen of lecturing each other on manners and morals that an imperfect case like this is made the peg on which to hang a flaming indictment of the honesty of the telephone management, and of its technical and administrative efficiency.

Meters do not suit a public prone to inaccuracy in matters of detail. All publics of all countries are inaccurate in matters of detail, so this is only another way of saying that the public dislike meters. The gas meter is as faithful a contributor to the comic papers as the mother-in-law; the electricity meter is a sore subject in many households; if we paid for our postage stamps by meter we should vehemently deny having sent so many letters last quarter. Yet how many people ever look at their gas and electric meters or count what they spend in stamps? The telephone meter has its peculiar difficulties because it must be controlled at the switchboard, as only about 70 per cent. of the work actually done by the telephone company is charged for. The ordinary newspaper writer says why not put an automatic meter on the subscriber's instrument, much in the same way as he would suggest, as a cure for all the troubles of the London service, putting all the wires in one mammoth exchange. The automatic meter on the subscriber's instrument seems the obvious thing to the non-technical man, who does not stop to think that such a meter would count every time the telephone was handled and would give results wholly useless as a basis of charging, since the only acceptable unit of charge is the outward effective call.

The present system of metering telephone calls is the outcome of much careful trial and experiment with apparatus, and of very detailed and elaborate analysis of telephone traffic. The method of charging is extremely generous to the public. Only effective calls are charged for; on many calls the telephone company does all the work, and uses all the plant required for an effective call, but the call is ineffective because the called subscriber does not answer, and it is not charged for. This is much as if the Post Office returned you a penny in the case of every undelivered letter. A purely automatic meter, controlled simply by the subscriber's telephone, would register all ineffective calls, and the proportion of ineffective calls varies so widely with different subscribers that an automatic count of all calls with a uniform allowance for ineffective calls would still be an impracticable method of charging for telephone service. Hence the evolution of the present system, in which the metre is associated with the subscriber's line at the exchange, and is worked by the operator at the end of a conversation, when the display of the two supervisory signals shows beyond doubt that a complete and effective call has taken place. It is suggested that the operator may register a call when she is not certain that an effective call has been had, and that the meter is not infallible. Neither operator nor machine is infallible, but the construction and electrical working of the meter are specially designed to prevent accidental working, and the method of registering calls is such that errors of the operator are more in the direction of omitting to register calls than of registering calls unwarrantably. We are confident that the telephone meter and the established method of working it will stand any scientific and impartial investigation.

As to the general charges of bad service in London and "administrative inefficiency" with which some newspaper correspondents have rushed into print, there is not a little to be said on the telephone side of those questions. As the JOURNAL has its limitations we do not propose to say it all now. But by those unfamiliar with the subject—and no newspaper has ever taken the trouble really to investigate the working of the telephone service—the difficulties of building up any large telephone system are not understood; while of the special difficulties of the London telephone area there is not the least appreciation outside of strictly telephone circles. The modern telephone system did not spring into being fully equipped, like Minerva from the brain of Jupiter. It has been the evolution of a quarter of a century of experiment and invention. With the lamp-signal central battery system, and with an extensive underground plant, the telephone service of a large city can be made highly accurate and reliable. Without such a plant a high

degree of accuracy and reliability is unattainable. But this character of telephone plant has only recently become available, and large telephone systems cannot be rebuilt in a day. They cannot even be rebuilt in a few years, unless all the conditions are exceptionally favourable. In this issue we print an article which shows that the Imperial German Telegraph Administration is only now fairly beginning to make the Berlin system metallic circuit, to put the wires underground, and to equip the exchanges and subscribers' stations with common battery apparatus. The work, it is stated, must be spread over several years, on account of its great cost. This is the Imperial German Administration, with unlimited powers and resources. In London the National Telephone Company's system was made metallic circuit many years ago, and but for the unreasonable obstruction of the London County Council a comprehensive underground plant would have been put down many years ago. A start was made in reconstructing the exchanges six years ago, when the success of the common battery system was proved, and nine large exchanges serving over 34,000 stations have been converted, while others are in course of construction. But, as the German article points out, the full benefit of the improved system cannot be obtained until all the exchanges are uniformly equipped. In Paris, where the telephone system is as in Berlin, a Government monopoly, and the administration has full powers over the streets and the resources of the nation behind it, a start has not yet been made in the reconstruction of the system. The London telephone area would hold Paris and Berlin ten times over, and most of its variegated collection of local authorities have obstructed telephone work at every opportunity. Yet in spite of these natural and unnatural difficulties the London telephone system is far in advance, technically and administratively, of those of Paris and Berlin. These facts, however, do not prevent the anonymous newspaper correspondent, who has had one call perhaps out of a hundred delayed from some cause or other, from alleging that the administrative efficiency of the telelephone service is superior in every other country. We should advise him next time he is in France, Belgium, Germany or Austria to ask the natives what they think of their telephone service. He will get a fresh point of view.

THE TELEPHONE SOCIETIES.

THE numerous Telephone Societies throughout the country have now fairly begun their active winter session. It is pleasing to note a substantial addition to their number, and we trust that the movement will continue until every centre where two or three telephone men and women may gather together has its Telephone Society. Owing to the specialised nature of much of our work and the small knowledge of telephony that exists outside of telephone circles, telephonic subjects are seldom discussed by the general electrical societies and institutions, and the telephone man gets few opportunities of hearing his own special branch of electrical engineering expounded. The Telephone Societies now offer such opportunities in plenty, and the periodical meetings should do much to broaden the interest of all hands in all branches of the work. As the various programmes published show, the range of topics to be discussed this winter is a very wide one. Every part of the plant and almost every phase of the work is to be dealt with in some part of the country. In order to make the papers presented of the greatest use to all concerned, we shall endeavour to publish as many of them as possible either in full or in abstract. Certain papers are to be given more than once before different societies, and these will necessarily be left till the end of the session. Regarding most of the others it may be said that the preparation for publication of a paper prepared only to be spoken, and often consisting of more or less rough notes, and the preparation of diagrams and illustrations from material that is also somewhat in the rough, are operations that sometimes take considerable time, so that it is generally impossible to get a paper into the JOURNAL immediately after its presentation before a Telephone Society. The JOURNAL, however, will do its best to make the valuable material brought before the societies available in more or less complete form as quickly as is practicable.

THE PRINCIPLES OF ELECTRIC WAVE TELEGRAPHY.

THE inaugural lecture of the 1906-7 Session of the Glasgow & West of Scotland Districts Telephone Society was delivered by Dr. MAGNUS MACLEAN, Professor of Electrical Engineering in the Glasgow Technical College, in his lecture hall at the college, on the evening of Wednesday, Nov. 7, on "The Principles of Electric Wave Telegraphy."

The lecturer began by stating that of the various methods which have been experimented upon for transmitting telegraphic signals from place to place without the use of intervening wires, three were worthy of special mention:

(1) The system which makes use of the electrical conductivity of the earth or of water;

(2) That which depends on electro-magnetic induction; and

(3) That based upon the fact that an oscillatory spark emits waves which may be detected by a suitable instrument at a distance.

Having shown a few slides to illustrate the conduction and induction methods, Dr. MACLEAN said that about 1864 MAXWELL published his electro-magnetic theory of light, based on the hypothesis of the propagation of electrical effects by wave motion in the ether, and between 1886 and 1888 HERTZ proved experimentally the existence of these waves. It was explained that the usual method of generating them is to discharge a highly charged condenser through an inductive resistance; such an oscillation circuit may be closed or open, the frequencies depending on the geometric mean value of the capacity and inductance. Numerous cases were mentioned of circuits to give wave lengths in hundreds of feet and frequencies in millions per second. Slides were exhibited illustrating what is meant by a damped electric oscillation, and also some to show that these waves exert an electric and a magnetic force mutually at right angles to the direction of propagation. This led the lecturer to discuss what kind of apparatus was necessary to detect electric waves. They could, he said, be classified in various ways; for example, as to whether the physical effect produced is due to electric or magnetic force. They could also be classified as to whether they are self-restoring or non-self-restoring after the wave passes them, or they could be classified as to whether they are affected by the amplitude of the maximum potential difference or current, or by the time integral of the square of the instantaneous current valves. Some of these different wave detectors or "cymoscopes" were discussed, and the principles of their action explained. The best known, it was stated, is that called the coherer. It had long been observed that a tube containing loose metallic particles, offers very high resistance to small electro-motive forces, but becomes of good conductivity if subjected to a high electro-motive force.

In 1890 BRANLY published an account of his researches, announcing specially that the resistance became suddenly lowered

when an electric spark occurred in the neighbourhood of the filings, Various developments by TURNER, POPOFF, LODGE and others were referred to in the lecture. A slide on the screen showed the form used by MARCONI in his early experiments on wireless telegraphy, viz., an exhausted tube having inside it terminals consisting of silver plugs with their ends polished and slightly amalgamated with mercury, the interspace, a couple of millimetres long, being filled with fine filings, 95 per cent. nickel and 5 per cent. silver. The action of the coherer depends, the lecturer explained, on the difference of potential created between its terminals by the electric wave. Another slide illustrated one form of the magnetic detector of MARCONI. The lecturer mentioned that in America between 1842 and 1850, JOSEPH HENRY carried out a large number of experiments on the magnetisation and demagnetisation of iron rods by means of discharges from a Leyden jar, and that in 1895 RUTHERFORD investigated the subject, and found that a small magnetised needle could be demagnetised by electric oscillations, and he used such a magnetic detector successfully at a distance of half a mile from the position of the Hertz oscillator. In the illustration on the screen the short and thin needles had two coils wound on them, the first being in the circuit of the aerial wave and the second having a telephone in circuit, a permanent horse-shoe magnet being rotated uniformly in front of the magnetic needles. When an electric oscillation passes through the aerial coil, the magnetic hysteresis of the needles is partly or wholly annulled and a click is heard in the telephone.

Having thus dealt with the means of producing powerful electrical oscillations, and with the construction and principles of the different kinds of apparatus for detecting the radiations, the lecturer went on to consider how to control and direct them so that we could communicate at will with any one of several stations without interfering with the messages that might be passing at the same time between any two of them. Three methods, he said, have been proposed and used for accomplishing this, the first being to direct the radiation of the transmitter, but that as the waves generally used are hundreds of feet in length, it is practically impossible to get mirrors large enough for this purpose; the second to tune the oscillations of the transmitter and receiver, so that those stations which have the same frequency of vibrations can communicate with one another, and the third tried was to vary the frequency of the sparks so as to give a distinctive character to each separate station. No. 2 method, it was explained, is the one most used, and explanatory slides having been shown of it, as well as others illustrating MARCONI's latest method of effecting the same purpose by directive antennæ. Dr. MACLEAN proceeded to demonstrate experimentally how the lengths of electric waves might be determined. His apparatus consisted of an inductance and capacity in series, these being capable of variation till a vacuum tube across the terminals of the condenser glowed brightest. Knowing the magnitudes of the inductance and capacity then in the circuit, the wave lengths and frequencies were determined, and thus wave lengths from 1,000 to over 5,000 feet and frequencies from a million per second to a fifth of a million per second were measured.

At the close of the lecture, which was followed with intense appreciation by those present, Mr. W. A. VALENTINE expressed the indebtedness of the Company and of the Society to Dr. MACLEAN for the interest he has always taken in the Company's employés, and especially for his admirable lecture. A cordial vote of thanks to the doctor was briefly acknowledged by him.

CREOSOTING POLES.

By J. T. TATTERSALL, *Local Manager, Hull.*

A RECENT visit to the creosoting works of Messrs. Wade & Sons, Hull, suggested to me that a description of the process of creosoting, etc., might be of interest to readers of the JOURNAL.

The use of creosote for preserving timber was first introduced in 1838; at about that time four distinct preservative processes were before the public, and since then a number of others have been brought out. Creosoting is, however, the only one that has satisfactorily stood the test of time; it is the most extensively used and best known, and also the most effective method of preserving timber against the elements, and is invariably used for telephone and telegraph poles in this country.

The value of creosoting poles as a preservative is clearly shown in the photos. Figs. 1 and 2, which explain themselves. This process may be said to treble or quadruple the natural life of a pole; cresoted poles have been known to have a useful life of between twenty and thirty years. If the creosoting is imperfectly done, however, the natural life of the pole is not materially lengthened; rot takes place internally, and the pole weakens unnoticed, the decay being covered by a thin shell of relatively well-preserved material.

Telephone poles principally come from Russia and Norway, where pine forests are numerous and extensive. Before the poles

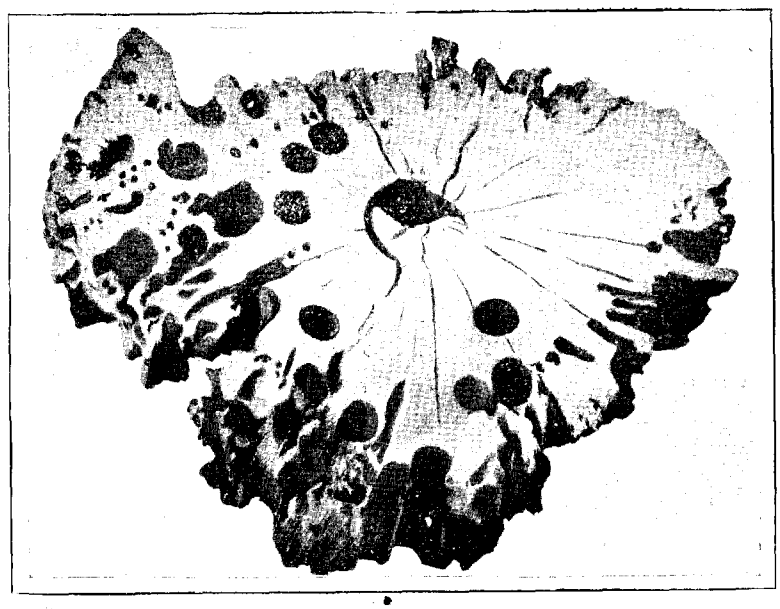

FIG. 1.—Specimen of Untreated Timber after exposure in water for about three years.

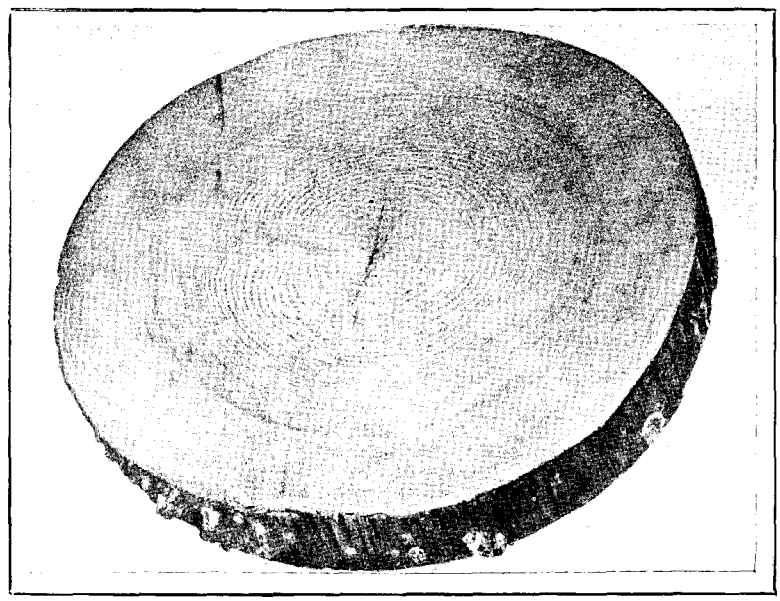

FIG. 2.—Specimen of Treated Timber after exposure in water for about twenty years.

are shipped the bark is taken off and the knots smoothed down. After their arrival at the yard they are taken in hand by the dressers, who trim and further prepare the poles. After this work is complete they are stacked away according to length, spaced about six inches apart, so as to allow a free circulation of air through the whole stack. The photo., Fig. 3, shows a number of stacks in the dressing and drying yard.

When the poles have been thus stacked for a period of three months in favourable weather they are ready for creosoting, but before this is begun the National Company's inspector carefully

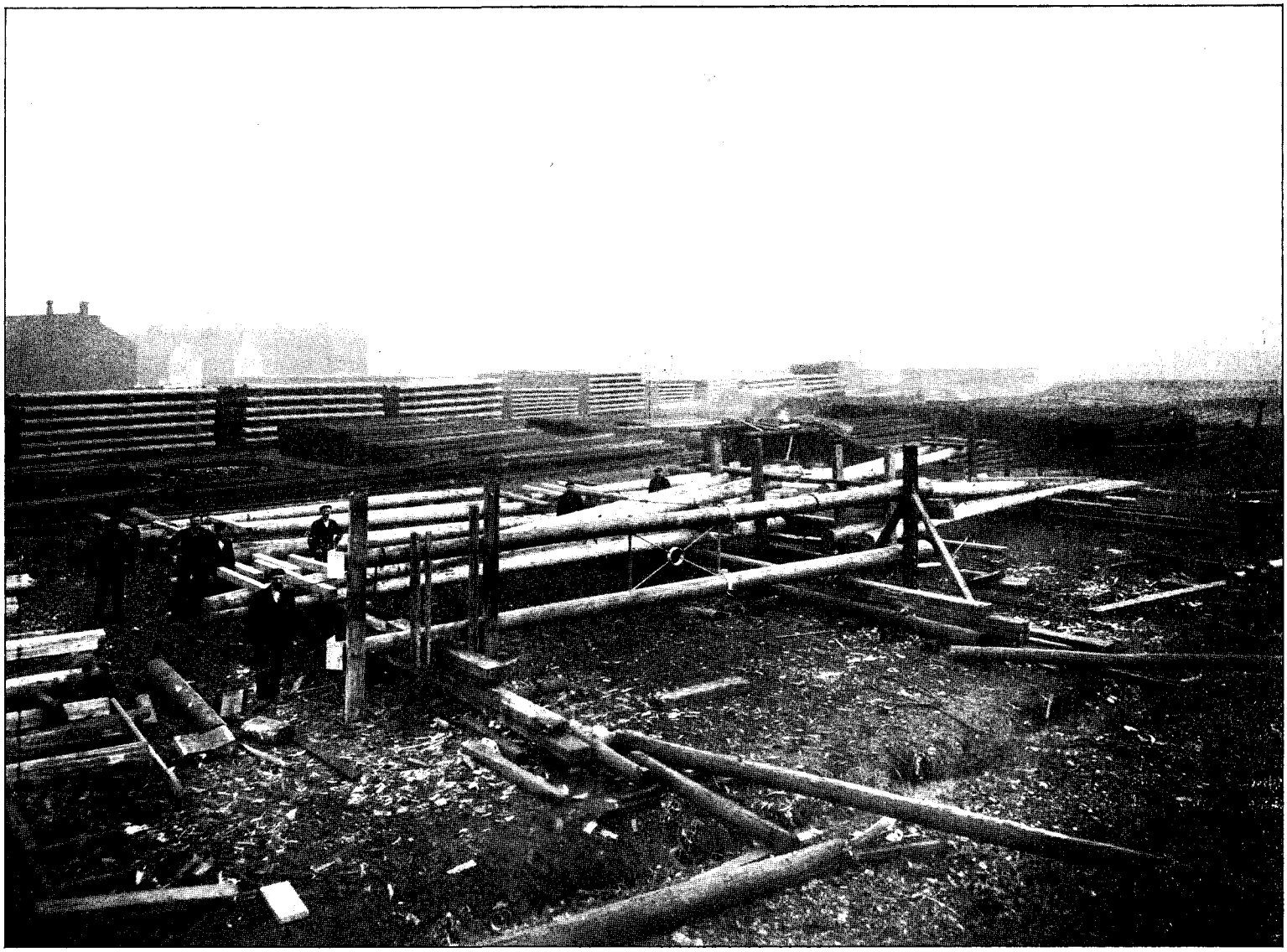

FIG. 3.—Dressing and Drying Yard.

examines each pole which the Company is to purchase to see that it comes up to the specification, stamping ten feet from the butt all those which comply with the requirements.

The poles are now inserted in the creosoting tanks; each tank consists of a steel cylinder, the ends of which are closed by heavy steel doors, clamped on. The air is then exhausted from the cylinder by means of a powerful vacuum pump, and the outlet having previously been closed, creosote oil, which is the heavy oil of tar (being a by-product of gasworks, etc.), is pumped into the cylinder, and a pressure of 80 or 100 lbs. per square inch, according to the nature of the wood, is maintained until the wood has absorbed the required quantity of oil—usually from $\frac{4}{5}$ths of a gallon to $1\frac{1}{8}$ gallon of oil per cubic foot. Fig. 4 shows a creosoting tank with a pole ready for insertion. As many as 100 26-ft. poles can be creosoted at a time.

After the completion of the creosoting process the poles are taken to what is known as the "black yard" and piled away in their respective lengths, not as they are stacked when drying, but close together to prevent them getting too dry; also in case of fire they would not burn so easily as if separated. The poles are now ready for despatch. A short time ago a series of important tests were carried out at this yard to ascertain the breaking weight of poles of various sizes, and in one case a 40-ft. pole bent to the extent of fourteen feet or fifteen feet out of the horizontal, like a huge bow, before exhibiting signs of strain or fracture.

For illustrations and useful information I am indebted to Messrs. R. Wade, Sons, & Co., Limited, Hull, who are one of the largest importers in this country, and have had great experience in the preparation of poles.

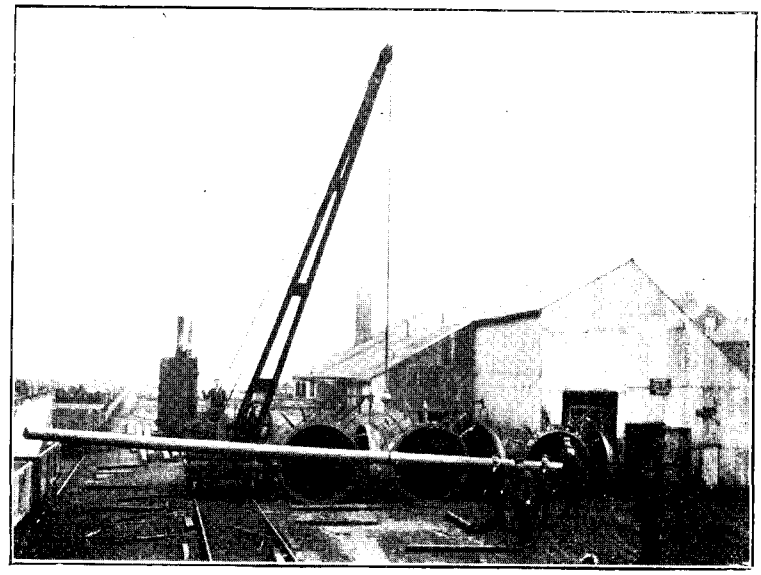

FIG. 4.—Creosoting Tanks, showing pole ready for insertion.

THE SELECTION OF OPERATORS.

BY FLORENCE J. MINTER, *Examining Matron, Metropolitan Traffic Department.*

REFERRING to Mrs. PETER'S excellent article in the October JOURNAL, some particulars of this branch of the work of the Metropolitan Traffic Department have been jotted down, which may not only prove of interest to our provincial colleagues, but give to our own army of operating staff some little known facts regarding what is being done to "sift the wheat from the chaff" in the selection of candidates to fill gaps in their ranks.

With the actual training of the operators I have nothing to do, that being in the hands of the clerk-in-charge of the Operating School and her six assistants; my part consists first, in finding the raw material, and, later, in sending out the finished article to fill exchange vacancies, so I can give no details of what goes on in the interim. I hope Miss RALPH will be prevailed upon shortly to give us this information, both as regards the present school and the new one which is rapidly being completed at London Wall, and of which we are all expecting great things.

The maximum number of "learners" in training is 75, and during all but the few months at the beginning and end of the year, we find it necessary to keep the school up to its full complement in order to meet the calls upon it.

June, July and August are the months for the greater number of vacancies, and at the same time for the smallest number of applicants; the inference is that as this is the holiday season girls just starting out wait until the summer holiday has been taken before looking for a situation, and those already in business make sure of a holiday before they take employment elsewhere.

We receive a great number of applications, and the weeding-out process begins from the time the letters are received, as many letters show at once that the applicant is unsuitable. At all stages during the process of selection we use printed forms, this being a necessity in labour saving. An applicant is advised of her rejection or an application form is sent her, which she is required to fill up with certain information and return.

These forms are carefully examined, and I interview in due course all those applicants who apparently possess the necessary qualifications. Interviews take place on three afternoons weekly the average number seen per afternoon being thirteen. As will be seen from subsequent figures the "sifting" process is continually going on, and comparatively few survive it.

I note that in Glasgow the girls are sent to the medical officer before being educationally examined, but such procedure is not followed in London as it would be great waste of time; unfortunately many applicants fail educationally, although the test cannot be termed severe. Both educational and medical examinations are held weekly, and as many as eleven have failed out of fifteen presenting themselves for the former examination. As to the cause of this I shall have more to say later.

My records cover the 34,000 applicants I have dealt with since undertaking this work in June 1902, but I will only give the figures for the last two years, 1904 and 1905:

		1904.	1905.
1.	Total number of applications by letter dealt with	5,013	2,552
2.	Forms dealt with	2,826	1,516
3.	Rejections from forms	1,336	429
4.	Actually interviewed	1,490	1,087
5.	Rejected after interviews...	574	388
6.	Educationally examined	916	699
7.	Educational failures	272	277
8.	Medically examined	644	455
9.	Medical failures	65	79
10.	Total engaged for school	579	353
11.	Transferred to exchanges	487	273
12.	Paid off or resigned from school ...	61	84
13.	Ditto, whilst in probation in exchanges	56	19
14.	Percentage of learners paid off	20	29
15.	Percentage of candidates engaged to total applications dealt with	11	13

Looking at the 1905 figures, the decrease compared with 1904 is very noticeable. This is accounted for by the fact that in 1904 an excessive number of new positions for both operators and supervisors were sanctioned—over 40 in one month—and a total of between 280 and 290 in the year, owing to the additions required to cope with the reduced hours in operators' uniform duties and the extra supervisors under the new scheme of supervision. This year (1906) the figures have gone up again, although I think the percentage of candidates engaged will show an exceptionally low figure.

With regard to the fewer learners resigned or paid off after entering the exchanges in 1904 compared with last year (item 13), this is partly explained by the rush through the school rendered necessary to fill the abnormal vacancies, and special tuition and consideration being given them in the exchanges in consequence, which perhaps cannot be given nowadays. It appears to me as an onlooker that the exigencies of team work preclude all possibility of "nursing" a learner into the work. Perhaps this is a question, however, on which others are better qualified to pass an opinion.

The reasons for the failure of the 56 who, out of 353, were paid off after passing through the school in 1905 were as follows:—

Unsatisfactory progress in the work after practising at exchanges	26
Lack of intelligence	14
Ditto ditto and abrupt manner ...	4
Articulation bad	1
Hearing bad	1
Too nervous for the work	3
General health bad	4
Breach of rules	3
	56

The 28 resigning from the school gave their reasons as:

Health not suitable for the work	14
Illness at home	4
Otherwise required at home	1
After being cautioned	2
Leaving London	1
,, to be married	1
Did not care for the work	5
	28

It speaks well for Miss RALPH'S tuition that the number of probation operators to be returned to the school for further tuition in 1905 was only four, and of these only one eventually had to leave as hopeless.

It is becoming increasingly difficult to find a sufficient number of girls of the right type, and of even the very moderate degree of education required, and there were actually 10 per cent. more failures educationally last year than the year before.

I am afraid my opinion of the Board School teaching would surprise the school authorities, but I form it on the results as seen in the raw material they send out as the finished article, represented by 80 per cent. of our applicants.

They are very "machine made," and what knowledge they possess has been crammed into them automatically, staying with them generally only long enough to gain for the school the Government grant, and in any case leaking out between the time they leave school at fourteen, and when they sit for our examination at seventeen. This being so we should gain by the reduction of the minimum age from seventeen to sixteen.

When we consider the class of subject taught in the ex-seventh standard (which invariably the girls proudly claim to have passed), and the fact that our tests, in arithmetic no higher than the first four rules and in English dictation from a low standard book, floor a large proportion of the candidates it will be seen that my opinion is justified.

There are happily exceptions which prove the rule, but the best results are obtained from those girls who have attended, after the ordinary school, a commercial college, such as Clark's, Cusack's, &c. I do not hold a brief for these colleges, but I must say I have a great admiration for their system of education. At Clark's

especially, the writing is excellently uniform, and I am able to tell from a girl's application form, without looking at the place of education, that she has attended a course at this commercial centre.

One of the most important of commercial requirements—handwriting—seems to receive too little attention in the elementary and even higher grade schools. This is a very regrettable thing, for bad handwriting has often lost applicants good appointments when perhaps they are otherwise well qualified, but many letters are committed to the waste-paper basket unread. In our own department many marks are lost in the education examination in this subject.

Correct spelling is, of course, regarded as absolutely essential to all seeking posts in a clerical capacity, yet how shamefully this is neglected in the ordinary run of schools.

Candidates trained at either of the colleges mentioned invariably obtain full marks in these two subjects. In ordinary schools it is the three "r's," the very foundation on which anyone can build, which are so terribly neglected, and neglected for a great deal of glittering but useless knowledge which goes in at one ear and out of the other.

The worst failures are girls from convent or small private schools, where I suppose qualified teachers do not always exist; or from cheap continental schools where, so far as I can see, everything gives precedence to the acquirement of a foreign language, or the attainment of a certain deportment.

These girls are, however, generally of a better class, but although they speak and look well, and would doubtless meet the general idea of the class of girl we require, the examinations invariably prove them educationally unfitted for a business career.

I was from the first a strong advocate of educational tests for candidates, seeing as I did from the subsequent results of their work, how much many were lacking in this respect, and the decision to examine educationally all candidates will, I believe, eventually give us a better grade of staff. At any rate, the examination is by no means a farce.

With regard to the principal reasons for rejection of candidates, the following figures may be of interest:—

Age and height insufficient	328
Unsatisfactory previous employment ...	172
Otherwise not of class required	100
Considered unsuitable for the work ...	93
Of inconvenient address	30
Illiterate letters or forms	231
Failed to pass education test	277
Failed to pass medical examination ...	79
Giving a total of	1,310

We have an excellent medical officer, who, although giving no one the benefit of the doubt, will sometimes see a candidate three or four times, if through following his advice they may become eligible for appointment, and we are thus often enabled to retain good material; the entire medical rejections for 1905 numbered only 79, made up as follows:—

Sight bad	11
Hearing bad	2
Anæmia	11
Defective teeth	25
Anti-vaccinationists	4
Throat troubles	5
General health bad	21
	79

In the actual selection of operators there are many things to be taken into consideration beside the class question. I find on the whole that the girl unaccompanied by her mother or father shows to much more advantage after the first shyness is overcome, and it is difficult to get a mother to abstain from answering questions put directly to her daughter. If a hint is given that this is required, then the daughter turns helplessly to the mother to be prompted. At any time due consideration must be given to possible embarrassment on the part of the applicant, and discrimination as to the manner in which she might eventually "shape" must be exercised.

It is to be regretted that individual training is practically impossible for the learner. Everybody has his or her idiosyncrasies, and if a learner's uncomfortable corners could be *judiciously* rubbed off—for the polishing process cannot always take precisely the same course—possibly the result would often be above the average.

In the actual selection the following points have therefore to be equally considered:—

Appearance.—The naturally slovenly, untidy person usually shows some evidence of her failings, and practice tells one where to look for the signs in a person otherwise carefully dressed for the occasion. It is unnecessary to say that girls showing real uncleanliness of dress or habit never get beyond the first interview.

Voice and Enunciation.—While this can usually be sufficiently tested during conversation, the reading test of the educational examination has been found of infinite value, and many girls who apparently speak correctly fail signally here. Foreign accents, failure to correctly sound the letter "r," or a lisp are of course inadmissable.

Manner.—Abruptness, or impertinent tone of voice disqualify, but one is naturally at some disadvantage in this respect, since the applicant desires as a rule to please if really anxious to gain the situation. Some people are apparently not anxious to do anything but to "pass the time," "have a change from home life," or "to make some pocket money." All of these I distrust, and, most of all, the person who "really does not need to come to business." I do more than distrust her, I seldom recommend her as a suitable person for the Company's service.

Intelligence.—I do not think the percentage of learners leaving for lack of this qualification can be considered great, because the number represented as "unsuitable" or "making unsatisfactory progress" does not necessarily mean they were actually lacking in intelligence. The educational examination does bring out remarkable examples of density however, and under the heading of "Intelligence" I couple the education of a candidate advisedly, for although some subjects of the examination may not be required, such a test is one which shows the common sense of the candidate.

Health (including hearing and sight).—This is, of course, a question for the medical officer, but where anæmia or defective sight or hearing is obvious, an applicant is naturally disqualified off-hand. Seventy-five out of 311 operators resigning in 1905 left through ill-health. Only one death, however, occurred during the year among a staff of over 1,800 operators.

Height.—Our standard is 5 feet 3 inches, and although this is waived sometimes to the extent of half an inch, or an inch in the case of a growing girl, rather than lose otherwise suitable candidates, it is considered that this standard should be maintained. It is remarkable how many girls are 5 feet 3 inches in height when applying, and how many inches can be added to one's stature in a short while, *i.e.*, in the case of a second application where a girl has been disqualified previously on account of height.

Age.—The Company have now reduced the age limit to sixteen, it being considered that much otherwise excellent material may be lost between the time a girl leaves school and the age when she is eligible for appointment as an operator; chiefly because to a great many it is necessary to take up some work before reaching seventeen. It is to be feared that, although some girls of sixteen may be older in manner than others of two or three years their senior, the average may be found to be somewhat irresponsible, or at any rate less likely to grasp the responsibility of the work. On the other hand, if consideration can be given, the younger girl should be more easily moulded, and the eventual result of the training be more marked. Although in the case of the evening service, the maximum is raised to 35, as a rule the candidates above 25 are less adaptable.

Recommendations.—The question of references in any business is a big one. Apparently the Company possesses a marvellous number of girls of splendid ability and character. I suppose everyone is a little afraid of telling exactly the truth in the matter of a letter of recommendation, and it is difficult to be quite honest and just, when one feels that one may be "damning" a person's character for life.

As to the applicants in general, they are drawn from all classes and here is where the whole operating staff could do wonders for the Company. In one American company at least, I understand, the majority of applications are received from the friends of the present operators. If this is so, the same mental, moral and social standard is maintained. My experience is that although a number of applicants do say they are recommended by "So and so," who is an operator, the majority certainly come from outside sources.

The question therefore follows:—Do the operators themselves sufficiently advertise the service?

If the Editor will allow me space, I hope at some future date to draw some comparisons between the Company's conditions of service and the average conditions of female labour elsewhere; comparisons based on facts which have come before me in dealing with, I should think, women and girls of every possible occupation; therefore this side of the question I must leave till that occasion.

"IN PROPORTION TO BENEFITS DERIVED."

IN discussing the message rate system of charging for telephone service an Australian writer, whom we quoted last month, said that it was a logical method to charge for telephone service "*in proportion to the benefits derived* by the consumer." Would that this were possible! If it were, telephone companies might make profits on a scale that would put banks, "stores," motor manufacturers and halfpenny newspapers to the blush, instead of eking out with much difficulty a miserable 5 per cent. dividend. Imagine the torrents of gold that would pour into telephonic coffers did telephone users pay "in proportion to benefits derived" from the use of the telephone service. Such a system of payment would make a city telephone system a source of wealth which a patent medicine proprietor or a soap manufacturer might envy.

Among the communications which the Company would receive if this method of payment were in vogue we cull a few at random:

397, Leadenhall Street, E.C.

THE NATIONAL TELEPHONE COMPANY, LTD.

Gentlemen,—I find that in the past year my firm have sent about 30,000 telephone messages to all parts of London by means of the line which we rent from you. I have calculated that the saving in office force and in messengers, telegrams, postage, etc., effected by the very large use we make of the telephone service amounts to about £1,000 a year. There is also a large saving in my own time, which has a distinct money value; and I may say that on very many occasions we have been able to complete profitable transactions by the aid of the telephone which otherwise would have entirely escaped us. I therefore have pleasure in enclosing cheque for £2,000 in payment for the year's service. While this does not correspond to the full value of the benefits derived from the telephone I think it fairly represents your share of the profits we make from the service.—Yours etc.,

PARKE, PYKE, & Co.
H. PARKE, Managing Director.

The *Daily Blare*, Plantagenet Court, E.C.

NATIONAL TELEPHONE CO., LTD.

Gentlemen,—We rent a large number of your lines and instruments and send a larger number of daily messages than any penny morning paper. The service enables us to keep in touch with our army of reporters in all parts of the Metropolitan area, which, as you know, is nearly as large as Belgium and takes some covering, and often by means of the instantaneous telephone we have been able to have accounts of sensational events set up in long primer with scare headlines before the events have actually begun to happen. We are able to report the daily life of popular actresses with an hourly and minute fidelity quite unapproachable before the establishment of your wonderful service, and its usefulness in keeping us in constant touch with the political opinions of the proprietor, wherever his lordship's motor may happen to be, cannot be too highly valued. We have by a liberal use of the service been able to follow all phases of the Book War as a war was never followed before.

We beg to enclose cheque for £10,000, which is, we believe, the largest cheque ever drawn for telephone service. We shall be glad to have your permission to reproduce it in an early issue of the *Daily Blare*. We are about to institute a series of "Interviews by Telephone," and if these are the success we anticipate we shall be glad to double our payment next year.—Yours truly, The *Daily Blare*,

D. QUICK, Business Manager.

J. CASPITA & Co., Cigar Merchants,
500, Piccadilly, W.

THE NATIONAL TELEPHONE CO., LTD.

Dear Sirs,—Since having the telephone installed at our establishment we find that we have had numerous orders by telephone which would not have come to us otherwise. The profits on these orders have been so satisfactory and the use of the telephone has made so many economies and improvements in our business that we gladly send you the inclosed cheque for £50 in payment for the year's service.—Yours truly, J. CASPITA & Co.

P.S.—Could you not increase the number of private house telephones in Mayfair, Belgravia, etc. We find that a good many of our customers do not seem to know what the telephone service is.—J. C. & Co.

1014, Grosvenor Square, W.

The General Manager,
THE NATIONAL TELEPHONE COMPANY.

Dear Sir,—It is with profound gratitude that I write to tell you that your invaluable service was last week the means of saving the life of my younger daughter, the Lady Angelina Marblearch. I cannot do less than send you my cheque for 500 guineas, the equivalent of the fee I have paid to the surgeon who, in the small hours of the morning, was called by telephone in the very nick of time.—Yours truly, SERPENTINE.

"The Nooklet," St. John's Wood Road, N.W.

The Manager, NATIONAL TELEPHONE COMPANY.

Dear Sir.—I had the telephone installed at my house five years ago, and in the old days of the flat rate I never could understand how you could afford to supply it so cheaply. I have for a long time past done all my shopping, visiting and quarrelling during the morning hours by telephone, which leaves me the whole of the rest of the day for bridge—the only sensible occupation for a mortal with brains, don't you think so? I am quite horrified when I think of the time I used to waste in shops and afternoon calls, and I simply could not live now without the telephone. It is so handy too when you want to get a fourth in a hurry because somebody has some silly theatre engagement. I send you a cheque for £37 10*s*., which I think is 10 per cent. of my last quarter's winnings.—Yours very truly,

SOPHIA BLENKINSOP-JONES.

P.S.—I am afraid your operator was offended the other day. When she asked me "what number?" I absently said "Grand Slam," and by her manner she evidently thought I had said something rude.—S. B.-J.

CHLORIDE STORAGE CELLS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WILL you kindly grant me space in the JOURNAL to correct an unfortunate error which has occurred in my "Practical Telephone Handbook." On page 41, line 3 from bottom, the name of the makers of the chloride storage cell is given as the Electrical Power Storage Co. This should have been the Chloride Electrical Storage Co., who are the sole makers of this cell in Great Britain.

Thanking you in anticipation, I am, yours very truly,

Telephone House, November, 1906. J. POOLE.

CORRESPONDENCE.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WILL some one of the staff be good enough to explain why some of the companies manufacturing common battery switchboards connect a condenser in multiple with the primary of the induction coil of the operator's transmitter, and why it will not talk if the condenser is disconnected.

Wood Green, N., November, 1906. F. J. HABGOOD.

[In the Western Electric common battery system the operator's transmitter receives current from the central battery through a 140-ohm retardation coil. A 2-microfarad condenser is bridged across the primary circuit between the transmitter and the retardation coil, and has the effect of forming a branch circuit, consisting of the transmitter, the primary of the induction coil and the condenser, in which the variations of current set up by the transmitter may operate freely; without the condenser the retardation coil would form part of the primary circuit and would act as a choking coil when the transmitter is in use, damping down the variations of current and cutting down the speech. In fact, the retardation coil does act as a choking coil, shunting the variations of current into the branch circuit formed by the condenser bridge while continuing to feed continuous current into the transmitter—an exceedingly ingenious arrangement.—ED. *N.T.J.*]

LIGHTING CURRENT AT POWER RATES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MR. REMINGTON'S scheme for obtaining lighting current at power rates, as quoted in the November issue of the JOURNAL, if not new, is at least ingenious.

If the supply companies could only be induced to look at the matter from the Blackburn district manager's point of view, all would be well, but such companies or corporations have a disagreeable habit of charging full lighting rates in all such cases, and when the loss due to transformation is taken into account, the anticipated saving becomes a serious loss and the money spent on low voltage fittings is practically wasted.

A few years ago when mains superintendent of a Yorkshire electricity station it was my painful duty to explain this point to an enterprising firm, who were lighting their workshop from a dynamo and motor driver by current obtained at power rates—*experientia docet.*

Manchester, November, 1906. GEO. S. WALLACE.

20/10 LEADS FOR OUTSIDE POT-HEADS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE difficulty in neatly stripping the braid off leads, noted by Mr. Frost in the November JOURNAL, is a real one. It is almost impossible to do this without damaging the rubber. Apart from this, the main point is whether the time saved by having the leads ready stripped would compensate for the increased cost of manufacture.

Two other points occur to me in connection with pot-heads generally. First, that the making of pot-heads could with advantage be standardised; for instance, the best size of sleeve for making a 50-pair pot-head might be ascertained and not left for an empirical solution in each case. Secondly, all pot-heads should be made separately and pass a satisfactory air pressure test before being issued. This is easily made by soldering a spare sleeve, with a dry air plug at one end, on to the pot-head and connecting to the air pump.

Incidentally, when cable work is in hand at outlying exchanges, something might be saved in expenses by having the pot-heads made as above at the centre where the jointer is stationed and sent to the job thoroughly tested and ready for fixing.

Crewe, Nov. 5, 1906. ERNEST A. PEARSON.

FILING OF CORRESPONDENCE.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

LARGE offices have had several systems propounded for their advantage; I think small local offices also lack system. I give briefly below one arranged by me which has many advantages.

Amberg index cases (transfer) are used, one for a month, numbered consecutively.

Letters originating a matter outward are marked with this box number only, say 30.

When reply is received it is registered in usual way with box number prefixed. Example: Instead of 1, 301; instead of 19, 3019. This is put on face of letter, thus $\frac{3019}{2/10/6}$, and forms the permanent reference number. It is then indexed as under in letters received register:

Brown W/L 3019, 106,732; the latter number being district office reference, or Brown W/L 3019 only if correspondence is with subscriber only, the district office reference number being added subsequently.

All outward letters now quote 3019 in connection with Brown W/L, and any replies received subsequent to the first are registered but not indexed, being marked $\frac{3019/3098}{6/10/6}$; 3098 is the registered number of the particular letter, the former number, 3019, being obtained by reference to the index.

When a subject is completed, papers are marked on the top left-hand corner, say, 3019, and put in basket for filing. The clerk takes the batch, turns up index, ticks off papers 3019 as filed, and puts away under B (corresponding with index) in case 30.

Simplicity and certainty are salient features if the system is adhered to.

Cambridge, October, 1906. E. J. WOODS, Local Manager.

THE BENEVOLENT FUND.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

Now that the "Telephone Staff Benevolent Fund" is inaugurated and well on its way to prosperity and usefulness, it seems an opportune time to consider how its finances may be augmented.

That a true spirit of benevolence permeates the whole of the staff is evidenced by the fact that no less a sum than £400 was voluntarily subscribed and handed over to the Hospital Saturday Fund during 1905.

Now as this large sum was collected principally by small weekly contributions, such a collection is not a great drain on any individual; it seems to me that it would be a wise departure, if say 50 per cent. of the amount collected were handed to the "Staff Benevolent Fund." This would materially help the fund, and necessitous members could be assisted in a way that might probably render hospital advice later on unnecessary.

I venture to suggest that the remaining 50 per cent. could be distributed among say half a dozen convenient hospitals in sums of say £20, or £25, for which the hospitals might be asked to give a certain number of subscribers' letters, such letters to be held by some responsible persons in central districts or positions convenient to all. A similar course has, I believe, been pursued with success for some time in connection with the Middlesex Hospital, a certain sum being contributed, for which the hospital authorities give a number of subscribers' letters, available for any member of the staff. The collections could be taken up just as they are at present, but on the understanding that half the amount would go to the Staff Benevolent Society.

I feel convinced that this scheme would be beneficial to all concerned.

Salisbury House, E.C., Oct., 1906. ROGER J. PAYNE, Cashiers' Department.

DISTRICT OFFICE FILING.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE system of filing papers in the Reading district office, mentioned by Mr. Garner in the October issue, would not, I am afraid, be acceptable in all districts. In the first place, it would be difficult to find the accommodation for a large number of filing cases, and further, I do not think such a display would altogether improve the appearance of a general office. Then, again, there must be a certain amount of time lost in taking off and replacing papers, which is a consideration in busy offices. In this district we endeavour, as far as possible, to deal with records right away as they come along, and any clerk with a set of drawers and a little method can keep his papers in good order and always have them before him.

Cardiff, Oct. 18. WM. H. KIRK.

WHAT THE COMPANY IS DOING.

THE Company opened eight new exchanges during November, making a total of 1,269. They were Whittlesea (East Coast district), Grange-over-Sands (Barrow), Rhos and Johnstown (Chester and North Wales), Wareham (Hants and Dorset), Wootton Bassett (Bristol), Ruddington (Nottingham), Cullingworth (West Yorks), and Feltham (Thames Valley). 4,001 new stations were added during October, making a total of 399,389.

LONDON.—*Regent's Canal.*—The underground work along the towing path from Paddington to Camden Road and from Kingsland Road to Limehouse is now nearing completion; total length of duct, 4 miles 1,620 yards—3,460 yards of 300-pair cable, 600 yards of 300-pair armoured cable, and 5,430 yards of 200-pair being laid.

Barking to Tilbury.—The contractors have now commenced the work of laying twelve miles of pipe-work, which will take 102-pair cable.

Chadwell Heath to Romford.—The work of laying three miles of pipe and drawing in 100-pair cable will be commenced shortly.

Wood Green.—Contractors have now instructions to proceed with the laying of 2,880 yards of blocks and 3,705 yards of pipe. 6,630 yards of cable from 50-pair to 300-pair will be drawn in.

East Ham.—The work of laying five miles of underground work with 3-inch pipes and 12-way blocks to take 25 to 600-pair cables is now practically completed.

Ilford.—The work of laying six miles of trench and putting in 3-inch pipes and 9-way blocks, and drawing in cables from 25 to 600-pair is now practically completed.

Upper Grange Road, Deptford.—2,778 yards of 153-pair cable and 1,964 yards of 204-pair cable are being withdrawn and replaced by 600-pair. To avoid disconnection to the service as much as possible, the work is being carried out at two week-ends, commencing at two o'clock on Saturday and reconnecting the service again during the Monday morning following.

Hammersmith.—The new building for this exchange it is expected will be completed by the end of January next.

Common battery equipment for 1,200 lines has been placed on order.

Operating School, London Wall.—The new school equipment was brought into use on Nov. 12.

Hotel Metropole.—A private branch exchange has been opened at the above hotel, with 481 stations and ten lines to the Gerrard Exchange. The service is available day and night, Sundays included. The common battery switchboard is fitted for three operators.

BRADFORD.—An order has just been completed for connecting 50 branches of the Bradford Industrial Co-operative Society with a private switchboard at their central offices.

NOTTINGHAM.—Three orders for private branch exchanges, involving approximately 50 stations have been obtained by the Contract Department who are in negotiation for several more.

WEDNESBURY.—*Patent Shaft & Axletree Co. Ltd.*—An order has been secured for private branch exchange with five exchange junctions, and 48 stations, thirteen internal and 35 external. The work is in progress.

LIVERPOOL.— Agreements have just been completed for a private branch exchange for the new building of the Liverpool Cotton Association, and a private exchange for private lines from the Cotton Exchange to the members' offices. A detailed description of the method of working will be given in a later issue. In addition to the above, contracts have been entered into (and in many cases the work completed) for 22 private branch exchanges.

NEWCASTLE.—*Jesmond Exchange.*—In connection with the new common battery system at this exchange, the underground mains have now all been practically drawn in.

SWANSEA.—The reconstruction of switchboard and exchange has now been completed. This included the installation of two new party line sections, one new party line transfer section, one outgoing corporation calls section, two incoming corporation positions, two National junction positions and two Post office positions. One of the old party line sections has been re-wired for exclusive lines, the other being re-wired for party lines. The old switchboard has been thoroughly renovated and brought up to date. The I.D.F. has been removed from one end of the exchange to the other. All relays, etc., have been removed from exchange to apparatus room and the power plant and accumulators transferred from the test room to apparatus room. This latter was done without the exchange working being interfered with in any way. This work has been in hand for a considerable time, and was carried out under the supervision of Mr. G. E. Bewick, Engineer-in-Chief's staff.

GALASHIELS.—To meet the growing increase of subscribers to the Galashiels Exchange the old pattern switchboard has been replaced by a 300-line multiple switchboard and also a 500-line testboard. The fitting of the new switchboard, etc., has been successfully carried out by the local staff.

CHESTER.—The contract has been let for an underground system at *Colwyn Bay*. It has been decided to place the telephone wires underground at *Wrexham*.

Northwich.—An aerial lead-covered cable system for this exchange is approaching completion. About two and three-quarter miles of cable, of sizes varying from 25 to 100-pair, have been erected and are rapidly being brought into use. Owing to the continued subsidence of the ground in this area, due to pumping for brine, underground work was out of the question.

EXETER.—*Newton Abbot.*—The reconstruction work, consisting of the substitution of lead-covered cables for open work, has now been completed.

LANGSIDE.— The installation of the new exchange equipment for 380 lines was started on Oct. 19.

The following lengths of duct and cable have been laid :—

1 mile of duct and cable at Bournemouth, 1½ mile at Bromborough, 1½ mile at Glasgow. 1½ mile of cable at Birstal, 1¼ mile at Blackburn, 1½ mile at Cradley Heath, 1 mile at Dewsbury, 1 mile at Dudley Hill, 1¼ mile at Folkestone, 1 mile at Jesmond, 1¼ mile at Leeds, 1¼ mile at Lytham, 1¼ mile at Northwich, 3½ miles at Nottingham, 1 mile at Tunbridge Wells, 1 mile at Ulveston, 1½ mile at Widnes, 2½ miles at Withington and Didsbury.

NEWS OF THE STAFF.

Mr. J. K. MURRAY, Local Manager, Tunbridge Wells, has been transferred to the Engineering staff, Glasgow. Before leaving, Mr. Murray was presented with a Gladstone bag and an engraved silver cigarette case. The presentation was made by the District Manager, on behalf of the combined staff of the Tunbridge Wells centre.

Mr. A. L. CURLING, on the occasion of his transfer to Tunbridge Wells as Local Manager, was the recipient at a farewell smoking concert of a handsome gold-mounted umbrella and walking stick, together with framed photographs of the electrical, clerical, and outside construction staffs. The presentation was made by the Chief Inspector, A. Read, the presents being subscribed for by the whole of the Chatham staff. Mr. Curling became a benedick on Nov. 2., carrying with him the best wishes for his future happiness from all that know him.

MR. P. W. CUNLIFFE, Local Manager, Neath, prior to his departure to Swansea as Engineer, was the recipient of a handsome travelling outfit, suitably engraved, subscribed for by members of the Neath staff.

M. W. A. GENT, late Local Manager at Pontypool, has been transferred to Neath, in the Swansea district, to fill a similar position.

Mr. E. E. ROBSON, Chief Electrician, Newport, has resigned from the service.

Mr. J. D. DUNCAN, of the Glasgow Contract Department has been appointed Contract Agent at Cardiff.

Mr. F. D. ASHWORTH, Wayleave Officer, Brighton, has been given a similar appointment at Watford.

Mr. J. GREAVES of the Provincial Superintendent's office, Birmingham, has been appointed Local Manager at Burton-on-Trent.

Mr. J. J. O'CONNOR, before leaving to take up his appointment as Contract Manager at Reading, was presented by the Brighton Contract Department staff with a set of carvers and plate.

Mr. THOMAS BARTON, the "Father" of the Glasgow office, has tendered his resignation, and leaves the service at the end of the year. Mr. Barton has reached the ripe age of 73 years, and at the time of leaving will practically have attained fifteen years' service. During almost the whole of that time he has acted as Wages Clerk, the duties of which position he carried out very efficiently. He carries with him to his retirement the sincere wishes of his superiors and his colleagues that many happy and restful years may be enjoyed by him.

Mr. MORELAND, Canvasser, was the recipient of a handsome marble clock, presented to him by the Cardiff staff, on the occasion of his leaving the Company's service to take up another appointment.

Mr. JAMES B. GAIRN, Inspector, Greenock, has been transferred to Edinburgh district. Before leaving he was presented by the district staff with a silver tea-kettle.

Miss HELEN RENNIE, of Royal Exchange, Glasgow, has been promoted to the rank of Supervisor in Charing Cross Exchange.

Miss B. DANIELS, of South Exchange, Glasgow, has been promoted to the rank of Supervisor in Tron Exchange. The members of the South Exchange presented her with a case of silver-backed brushes, which they asked her to accept with their good wishes.

Mr. G. WALTON, jun., Dundee, on the occasion of his being appointed Inspector-in-Charge at Wick, was presented with a handsome gold albert, subscribed for by the members of the Dundee staff, as a token of their goodwill and esteem.

Miss L. DAKERS, Senior Operator, Manchester, has been transferred to Bolton to take up the duties of Clerk-in-Charge there. She has been with the Company since 1895.

London Traffic Department.—*Promotions and Transfers for November.*

Mr. C. W. PIGGOTT for the past 22 years a member of the Metropolitan staff, for the last nine of which he has held the position of Exchange Manager of the Hop Exchange, has been promoted to be Traffic Manager at Birmingham. He was presented with a handsome case of cutlery and a case of fish carvers, as a farewell gift by the various staffs in connection with the Hop Exchange. Since leaving London, Mr. Piggott has also been the recipient of an oak bookcase from his colleagues in the Traffic Department and several of the Metropolitan officials with whom he has had personal dealings, including the Metropolitan and Service Superintendents.

Mr. F. GROVE, Exchange Manager, Bank Exchange, has been transferred as Exchange Manager to Hop Exchange.

Mr. J. W. WILKINSON, Exchange Manager, Deptford, has been transferred as Exchange Manager to Bank Exchange.

Mr. A. L. MAY, Exchange Manager, Birmingham, has been transferred to London as Exchange Manager, Deptford.

Mr. E. G. BUTCHER, Exchange Manager's Assistant, Kensington, has been transferred to the Maintenance Electrician's Department.

Mr. W. BRAIDEN, formerly Night Clerk-in-Charge, Hop Exchange, which position he resigned through illness, has been re-engaged as Exchange Manager's Assistant on probation for Kensington.

Miss M. ASHMEAD, Senior Supervisor, Gerrard Exchange, has been promoted to be Clerk-in-Charge, North Exchange.

Miss H. HILL, Supervisor, Gerrard Exchange, has been made Senior Supervisor at the same exchange.

Miss K. PRING, Supervisor, London Wall Exchange, to be Senior Supervisor, East Exchange.

Miss E. BIGG, Senior Operator Hop Exchange, has been made Supervisor at the Operating School.

Miss L. BRANWHITE, Supervisor, Kensington Exchange, has been transferred as Supervisor to Holborn Exchange.

Miss E. BRIGGS, Senior Operator, Avenue Exchange, has been promoted to be Supervisor, Gerrard Exchange.

Miss E. BULL, Supervisor, East Exchange, to be Supervisor, London Wall Exchange.

Miss H. CHESTERMAN, Senior Operator, Bank Exchange, to be Supervisor, Operating School.

Miss P. MÜCKE, Senior Operator, Paddington Exchange, to be Supervisor, Kensington Exchange.

Miss E. A. MOBLEY, Senior Operator, Hop Exchange, to be Supervisor, London Wall Exchange.

Miss OLIVE PIER, Senior Operator, London Wall Exchange, to be Supervisor, Operating School.

MARRIAGES.

Mr. E. J. WOODS, Local Manager, Cambridge, was, on the occasion of his marriage, presented by the Cambridge staff with a framed engraving.

Mr. F. COLE, *of the Contract Department, Liverpool, was married on the* Nov. 3 at Sutton Wesleyan Church, to Miss M. M. Featherstone. He was the recipient of a handsome clock (suitably inscribed), a pair of marble ornaments, and a pipe in case. The presentation was made by the District Manager.

Mr. H. DAVIES, Switchboard Inspector, Manchester, was presented with a handsome overmantel as a token of respect, from the Electrical staff, on the occasion of his marriage.

Mr. J. G. MILLAR, Asssitant Engineer, Tottenham, was married on Nov. 17, 1906, at All Saints' Church, Forest Gate, to Miss Maude Parsons. Mr. Millar was the recipient of a marble clock, presented to him by the various staffs of the northern district, with their heartiest congratulations for his future happiness.

Mr. C. H. REDHEAD, Local Manager, Wolverhampton, was presented by the District Manager, on behalf of the staff, with a handsome case of carvers on the occasion of his marriage.

Mr. W. H. COYNE, Inspector, Dundalk, was presented with a silver teapot and marble clock, by his friends and colleagues in the district, on the occasion of his marriage, which took place at Dromgoon Parish Church, Cootehill, on Sept. 5, 1906.

Miss E. R. DAVIES, Senior Operator, Swansea, has resigned to be married.

Miss HILDA ARMSTRONG, Senior Operator in South Exchange, Glasgow, left last month to be married. Before leaving she was presented by the staff in South Exchange with a case of cutlery, which they asked her to accept with their good wishes.

London Traffic Department.—*Resigning to be married:*

Miss F. HUGHES, Clerk-in-Charge, North Exchange, who has been in the service nearly 22 years, was presented by the combined staffs of North and Dalston Exchanges with cases of fish servers and fish knives and forks, also a butter knife. She sails in about three weeks' time for Jamaica where her marriage takes place.

Miss A. E. BENN, Supervisor, Gerrard Exchange.

Miss E. EILES, Operator, London Wall Exchange.

Miss M. VAN WALWYK, Operator, Gerrard Exchange.

OBITUARY.

Mr. Wm. TUCKER for many years Chief Foreman in Plymouth, died on Nov. 12.

STAFF GATHERINGS AND SPORTS.

Liverpool.—A smoking concert was held at the St. George's Restaurant, on Friday Nov. 2, when the opportunity was taken to present Mr. Rowe, on his retirement after 25 years' service, with a solid silver tea and coffee service, and Mrs. Rowe with a gold chain. The presentation was made by Mr. R. H. Claxton, the Local Director, who was supported by the Provincial Superintendent, the District Manager, and many members of the staff, including representatives from other districts. Many letters and telegrams were read during the evening, congratulating Mr. Rowe on his past record, and wishing him health and happiness in his retirement.

Edinburgh.—*Ampère Golf Club.*—The final of the Autumn Foursome was played over the Braid Hills course on Saturday, Oct. 27, and resulted in Mr. J. D. W. Stewart, District Manager, and Mr. J. H. Allan (minus 2) defeating Mr. R. G. Richardson and Mr. J. B. Haig (plus 3). The complete prize list for the season is: Spring Foursome (9 holes), Messrs. H. V. Main and J. Crear; Summer Hole and Hole, Mr. J. A. Swanson, Mr. J. B. Haigh (runner up); Autumn Foursome (18 holes), Messrs. J. D. W. Stewart and J. H. Allan. A smoking concert was held in the Melville Hotel, on Friday, Nov. 16, under the auspices of the Golf Club committee. Mr. Stewart, and latterly Mr. Robert Wilson (captain), presided over a gathering of about 80 gentlemen, and appealed for a larger membership of all classes. The secretary submitted a report, remarkable for lucidity and detail, and Mr. Stewart and Mr. Wilson presented the prizes. A lengthy programme, including pianoforte, violin, gramophone and banjo items was carried through, the "national" character of the meeting being emphasised by a Highland dance and bagpipe selections. The gathering was made the occasion of presenting two members of the staff (Mr. J. A Swanson and Mr. G. Galloway) with marriage presents, and Mr. Stewart, in handing over to these gentlemen an inlaid mahogany clock and kit-bag, and a marble clock respectively, referred in happy terms to their long connection with the Company.

Keighley (West Yorkshire district).—The staff held their annual social gathering on Nov. 6. There were about 50 members and friends in attendance. A whist drive, concert, and dance provided an evening's entertainment which was of an enjoyable nature.

Nottingham.—A progressive whist party was promoted for the members of the staff of the Nottingham Factory at the Mikado Café on Nov. 2, when a most enjoyable evening was spent by the 50 guests present. Twenty-three deals were played. Miss Baxter and Mr. Stanton, each with 160 tricks, carried off the first prizes for ladies and gentlemen respectively. A football match was played on Saturday, Nov. 3, between teams representing the staff and factory (Station Street). Notwithstanding the heavy state of the ground a remarkably fast and enjoyable game was witnessed by a large crowd of employees. The game ended in a win for the Factory 1—0, *the goal being scored by Wilson.*

Brignton.—A Rifle Club on the same basis as the Earl Roberts' scheme has been formed among the Company's staff at Brighton, the district manager (Mr. F. W. Taylor) being president, and Messrs. F. W. Roberts and H. Legg, (local manager and engineer respectively) vice-presidents. The committee consists of Messrs. H. Hatton, H. Davidson. F. H. Johnson. D. Gunn, W. Steel, and H. Summarsell; Mr. E. Brickett being the captain, Mr. A Brackley, hon. secretary, and Mr. A. W. Dalton, treasurer. The club has started with good numbers and in a blaze of enthusiasm. At the opening shoot, Mr. Roberts fired the first shot, and scored an "inner." A highest aggregate medal has been given to the club by the captain, and it is hoped in the near future to compete for some of the trophies given in various parts of the county in support of this important national movement. By the time the JOURNAL appears in print, a much talked of football match will be played at Brighton between the local Telephone Football Club and a similar body from the National service in London. This match is causing a large amount of interest at both ends.

Manchester.—On Saturday, Nov. 17, the annual football match took place at Manchester between the Liverpool and Manchester staffs. Play was curtailed on account of the very heavy rain, but the score at the conclusion was Manchester 1 goal, Liverpool *nil.* In connection with the visit of the Liverpool staff, arrangements had been made for the party (including the Manchester staff) to visit the new Chief Fire Station and the School of Technology. About 150 members availed themselves of the privilege of viewing these fine buildings. An excellent tea at the State Café in the evening brought a pleasant day to a close.

TELEPHONES IN JAPAN.

WHEN a Japanese dies in Tokio one of the assets of his estate is his telephone, and the privilege of taking over the dead subscriber's instrument is worth just $400 to his heirs.

The Government of Japan is interested in telephones for the reason that such instruments of communication are a monopoly in the little empire—a government monopoly. It is a fact of world-wide recognition that governments as a rule do not pay particular attention to industries which they may happen to possess a monopoly of; and this maxim is apparently true of Japan, though it is possible that Japanese telephone systems may be modernised.

The great complaint in Japan is not so much against the quality of the instruments and equipment of the systems as against the total inability of the government to supply service to all would-be subscribers. To get a telephone in Tokio a man either has to buy out a subscriber or wait his turn to secure an instrument, and there are no fewer than 8,000 people on the waiting list ahead of him.

The government is unable to supply the demand for the simple reason that it has not the instruments, has not the working force to install the telephones if it had them, and then, of course, the government has a monopoly.

In Japan, telephones are rented to subscribers at a flat rate, it makes no difference for what purpose they are used. A telephone for a private house costs just as much as one for a business office. In the city of Tokio, which has a population of a million and a half people, there are 22,000 telephone subscribers, and thousands more who would willingly give $100 to secure accommodation.

The cost of a telephone in Tokio is $40 per annum, and that is gold, not silver, and the amount is payable strictly in advance. While the receipts of the government from its telephone monopoly are large, the cost of operations is comparatively light. For instance, it pays its linesmen, the best of them, at the rate of 50 cents per day, and the nine-hour day has not yet been introduced in Japan. Switchboard operators are hired by the month, and they are paid $5 per month.

Notwithstanding the fact that the net earnings from the telephone system in Tokio are very large, and there is every incentive to supply as many customers as possible, the government has so far found it impossible to keep even with the demand. In Tokio alone, it is estimated that some four years will elapse before the government will be able to supply an instrument to the last man who puts his name on the waiting list. Of course, many would-be subscribers die before their turn comes, and the man has the doubtful consolation of knowing that chances may throw an epidemic of disease among those on the long waiting list, and if he be spared, his chances of getting an instrument during his life-time are immeasurably increased by the deaths of the others.—*Boston Financial News.*

LOCAL TELEPHONE SOCIETIES.

Manchester.—The first meeting of this session was held on Oct 26, when a paper was read by the vice-president, Mr. Magnall, on "Covered Distribution." In the absence of the president, the chair was taken by Mr. Taylor. The paper dealt fully with the subject, both from an external and an internal point of view, and was illustrated by a number of diagrams and sketches. A very interesting discussion followed, and the proceedings terminated with a vote of thanks to Mr. Magnall. Mr. H. Laws Webb lectured before the society on Nov. 9 on what he described as "A Ramble Round the Telephone Systems of Europe," touching on the rates, development, plant, etc., existing on the Continent. Some very interesting questions were asked and answered. Mr. Webb also exhibited his very fine collection of lantern slides. A hearty vote of thanks for his interesting and instructive lecture brought the proceedings to a close. The chair was taken by the president, and there was a good attendance, including visitors from Oldham, Bolton, and Warrington districts.

Glasgow and West of Scotland.—It is with great pleasure we report that the Governors of the Glasgow and West of Scotland Technical College have placed one of their large lecture halls at the disposal of the society for their meetings during the coming winter. In past sessions the members met in the Company's premises, but the best room available provided insufficient accommodation, and was unsuitable in various other ways. The fact that the society may now meet in an up-to-date lecture hall equipped with lantern and all facilities for illustrating the various papers by experiment and demonstration will act as an incentive and add interest to the work of the session. By payment of the small membership fee of 1s. per session the members of the society are to be allowed full use of the college library. The kindness of the college authorities in granting these facilities is much appreciated.

Bradford.—At a general meeting of the staff, under the presidency of Mr. Sutcliffe, the district manager, it was decided to form a telephone society. A committee was formed, and meetings are to be held monthly. A syllabus is in preparation. The contract agent, Mr. T. W. Jowett, has promised to give the first paper on "Contract Office Relations to other Branches of Service."

Blackburn.—The second meeting of the session was held in the Weavers' Association Rooms on the eve of Nov. 26, Mr. Remington, district manager, presiding over a good attendance of members (percentage being 85). A paper was read by Assistant Engineer Moon, of Burnley, on "Outside Working: its Advantages and Disadvantages." The points dealt with were diagramatically shown in complete form, and after a very full and useful discussion the meeting closed with a vote of thanks to Mr. Moon for his valuable paper.

Sheffield.—The second meeting of the session was held on Nov. 14. The evening was pleasantly and profitably filled up by an exhibition of lantern slides prepared by Mr. F. G. C. Baldwin, A.M.I.E.E., and Mr. F. Barr. The slides illustrated various phases of work in connection with outside construction, overhead and underground, and were suitably explained by the gentlemen who had prepared them.

Brighton.—On Nov. 12, a lecture was given by the district manager (Mr. F. W. Taylor), the subject being "Common Battery Junction Working." There was a large attendance of members and visitors, including a number of ladies. The lecturer was provided with a complete equipment for the practical illustration of his remarks, the result being a highly interesting address which was followed very closely by those present.

Newcastle.—The second meeting of the local society was held on Nov. 25. After a few remarks by Mr. Drummond, a paper was given by Mr. J. Jones, entitled "Pole and Standard Work on Buildings," with illustrations. The number of members present was 33, and it is hoped to increase the number to 50 by the next meeting. A permanent committee was elected, and it was also decided that the meetings in future be held once a month (date not yet fixed).

Cardiff.—The first meeting of this society, was held at New Street on Nov. 13, with an attendance of about 60. Mr. R. A. Dalzell, (provincial superintendent), the president, gave an interesting paper on "Departmental Co-operation." He also referred to the question of "Economic Finance," and illustrated his remarks by diagrams and curves. A successful session is anticipated.

Swansea.—The telephone societies here are in a very flourishing condition. On Monday, Nov. 5, Mr. H. M. Pope, assistant engineer, gave a capable lecture on "Line and Engineering Work" to a representative and interested gathering. The lecture was much appreciated, and an animated discussion ensued. The president (Mr. W. E. Gauntlett, district manager) was in the chair, and was supported by Mr. R. Williamson (local manager), vice-president.—The Operators' Society also met on Wednesday, Nov. 7, for its second sessional meeting. An excellent paper was given by Mr. W. E. Gauntlett, district manager, on "The Telephone Operators and Operating." The thanks of all are due to Mr. Gauntlett for the instructive and interesting matters brought forward, and much benefit is hoped to be gained therefrom. A hearty vote of thanks was accorded the lecturer at the close of the meeting.

Birmingham.—The inaugural meeting of this society took place on Nov. 2, Mr. Coleman, provincial superintendent, delivered a presidential address. Afterwards Mr. Gill, engineer-in-chief, gave a very instructive lecture, illustrated by lantern slides, in connection with his recent trip to America. The meeting was very successful, over 130 members being present.

Norwich.—On Oct. 26 a general meeting of the staff was held for the purpose of considering the formation of a telephone society. A provisional committee was elected to obtain full information respecting the formation and working of such societies, and to report to the staff at a later date.

London.—The first general meeting of the session was held on Oct. 29, with Mr. F. Gill as chairman, at which the election of new officers took place., Mr. C. B. Clay being elected as president for the ensuing session. Mr. B. S. Cohen then gave a lecture entitled "Transmission Measurements" Most interesting demonstrations and experiments were shown by means of a projection oscillograph, etc. The meeting concluded by Mr. S. J. Goddard proposing a hearty vote of thanks to Mr. Cohen.

The second meeting was held on Wednesday, Nov. 21, Mr. C. B. Clay in the chair. There were about 350 present, including many operators. A most interesting and instructive address was given by Mr. H. Laws Webb, entitled "Telephones on the Continent," illustrated by a lantern. Discussion followed, to which Mr. Laws Webb replied. A vote of thanks to Mr. Webb brought the meeting to a close.

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TELEPHONE MEN.

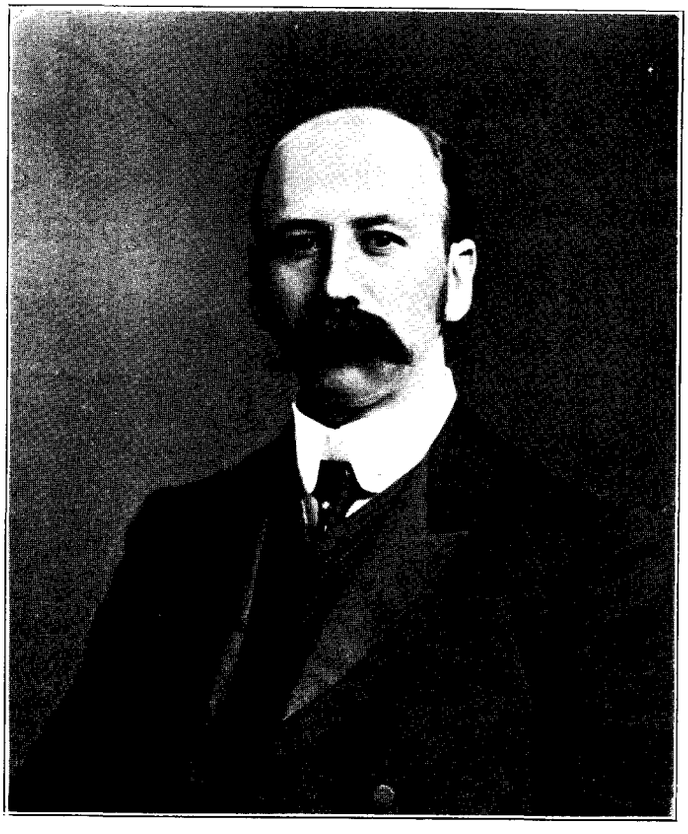
VIII.—WILLIAM ALEXANDER VALENTINE.

IT is sometimes said that Scotsmen after crossing the Tweed never return to their native land. The subject of this article has falsified the saying.

Born at the historic town of Stirling, March 29, 1869, Mr. VALENTINE was educated at the public school there.

When seventeen years of age he accepted an offer from the Company's Manager, who was then introducing the telephone service to the Midlands of Scotland, and joined the National Telephone service as Local Representative.

Starting in a small centre, Mr. VALENTINE obtained a rough and ready but general training in telephone work, both in the clerical and electrical branches.



In 1888 an opening occurred in Kirkcaldy for an Instrument Inspector, and Mr. VALENTINE was transferred there, but after four months' service in the "lang toon," the management promoted him to the position of District Manager for the North of Scotland, with headquarters at Inverness.

In these very early days of commercial telephony in Scotland Mr. VALENTINE had many quaint experiences of primitive methods of construction and working, and of the attitude of the inhabitants towards the new invention. Travellers on the Caledonian Canal will remember Dochgarroch Lock, at which a telephone call office was fitted to enable tourists to book rooms in hotels at Inverness. The lock-keeper's wife, an old Highland lady of about 70 years of age (these were the days before pension schemes were introduced), undertook to look after the instrument. A fine testimonial to the capacities of the telephone was given by the astonished old lady when, after speaking for the first time to a friend in Inverness, who replied in Gaelic, she exclaimed, wonderstruck, "It doesna' refuse the Gaelic."

Two peaceful years were spent in the Highland capital. The staff was a small one, and opportunities were given to one man to do a great variety of work. For example, in connection with the opening of several outlying new exchanges it was not uncommon for the District Manager to have to buy larch poles on the hillsides, see them cut down and charred, obtain the necessary wayleaves from the highland lairds, and fit up the switchboards and instruments. On one occasion Mr. VALENTINE went to survey for a line from a mansion house to a shooting lodge across the hills overlooking the Trossachs (this was in the Stirling days) "where human foot had ne'er been planted"—at any rate a telephone foot. A young Scotch gamekeeper was sent as guide. The survey occupied the whole day; the gillie had a few biscuits and lots of whisky which he partook of in copious draughts from time to time until it was feared that the surveying party might never get back to town, but in the evening presented himself before his master as sober as a judge.

The general method of working in these days was magneto calling and clearing, and the lines were single and of iron. For junction lines No. 11 galvanised iron was used. There were many curious makeshift pieces of apparatus in use. One of these that stands out clearly in the recollections of old days was a large foot-switch attached to the Inverness switchboard, working after the fashion of a piano pedal. This was used for cutting in the battery of the operator's transmitter. It was a splendid arrangement for catching dust and getting out of order. In those days the operator needed as many hands and feet as a motor-car driver—who needs three of each.

Not only telephony but applied electricity generally was in its infancy in Scotland during Mr. VALENTINE'S early career in Scotland. He once had the opportunity to correct a case of misapplied science which had nothing to do with telephone work. A wealthy Strathspey distiller, hearing of a serious accident caused by lightning to a building in the south, decided to have a proper protection for his distillery. A local firm was employed and a heavy copper conductor was fixed to the chimney stack, with a magnificent spiked tiara at the top. The "electrician" wanted to make sure of a safe "earth" so he obtained a large wooden barrel, dug a hole in the ground placing therein the barrel filled with water and into this coiled the end of his valuable lightning protector so as to "pit the lichtnin' oot"! This ingenious arrangement was exhibited with pride. A change was

promptly made, on expert advice, and in the meantime Jupiter was kind.

This idyllic existence in the far north was ended by a transfer to Cottonopolis at the end of 1890, when Mr. VALENTINE joined the staff of the Mutual Telephone Company as Assistant Manager, returning in May, 1893, to the National Company as District Manager in charge of Manchester. The Mutual was organised to compete with the National in Manchester, and for a short time carried on a merry telephone war with a very crudely built plant. The call-wire system was adopted and two loops were carried into each subscriber's place. At first battery transmitters could not be obtained, and spoon-shaped magneto transmitters of the pattern popular in Germany were used. These gave remarkably good results for local talking. Eventually the Mutual system was absorbed by the National and Mr. VALENTINE became National District Manager at Manchester.

In 1898, shortly after the famous Glasgow inquiry, Mr. VALENTINE returned to Scotland and was put in charge of the Glasgow area, where a stiff telephone fight with the Glasgow Corporation has taken place. It is common knowledge that the Glasgow Corporation retired from the telephone business a few months ago.

During these eight and a half years the business in Glasgow has increased from 7,450 stations to 29,500 at the present time. Twenty-four new exchanges have been opened, and the staff, which in 1898 numbered 418, has now reached a total of 1,202.

The position occupied by Mr. VALENTINE at Glasgow has been most arduous and responsible, as every branch of the work has been carried on at Glasgow on a larger scale than in any other district in the country; he has filled his post with credit to himself and to the Company, and in all branches of the work, technical and commercial, the organisation of the Glasgow district is well to the fore. Only a thoroughly well-organised and able staff could have so successfully withstood the severe strain of the fire of a year ago.

Mr. VALENTINE has interested himself in all which tends towards bettering the *camaraderie* of the staff and finds ample opportunities in the numerous agencies now at work. He has a high opinion of the ability and loyalty of the Glasgow staff.

Mr. VALENTINE became an Associate of the Institution of Electrical Engineers in 1891.

In his leisure time he favours golf for recreation.

FOREIGN INTELLIGENCE.

Germany.—The following statistics are taken from the *Archiv für Post und Telegraphie*, and show the development of the telephonic system of the Imperial Postal Administration, which, however, does not include Bavaria or Wurtemburg. The number of exchanges and sub-exchanges working in 1905 was 4,062, and the total number of places provided with telephone service was 21,397, as against 19,495 in 1904. The total of subscribers' stations increased from 444,954 to 510,831. The length of wires in work was 1,277,602 kilometres, with a spare capacity of 587,315 kilometres, and the total annual number of calls was 1,081,169,176, or 2,964,040 a day. The principal exchange systems are Berlin, with 74,836 stations; Hamburg, with 31,707; Frankfort-on-Maine, with 14,104; Leipzig, with 13,159; Dresden, with 12,917; Cologne, with 11,163; and Breslau, with 9,364 The trunk system comprises 5,234 metallic circuit lines, with a length of wire of 503,094 kilometres. The longest are Berlin to Paris, 1,192 kilometres (848 of which are within German territory); Berlin to Memel, 944; Berlin to Budapest, 941 (513 kilometres in Germany); and Berlin to Basle 914, of which 417 kilometres are within the Imperial Telegraph Department's jurisdiction.

Hungary.—The report of the Hungarian Post and Telegraph Department for 1905 gives some interesting statistics of the progress of the telephone in the Magyar kingdom. The total length of lines at the end of that year was 21,768, and of wires 190,962 kilometers. The number of exchanges has increased from 893 in 1904 to 978, and the number of subscribers' stations from 26,171 to 30,002. The principal systems are Budapest with 9,534 stations, Fiume with 887, Zágráb (Agram) with 849, Temesvár with 847, Pozsony (Pressburg) with 809, Nagyvárad (Grosswardein) with 692, and Kolozsvár (Klausenburg) with 633. The total number of calls increased from 62,861,537 to 83,024,244, of which 82,106,997 were local and 917,247 trunk calls.

Greece.—The only places in Greece provided with the telephone are Athens, Piræus, Kephissia, Patras, and Vostitza. There are trunk lines from Athens to Patras and Vostitza, and upwards of 700 subscribers altogether in the five towns.

Iceland.—Telephones exist only in Reykjavik, Akureyri, Isafjördur, and Seydisfjördur, connecting some neighbouring points with these towns. In Reykjavik there is a telephone line between the bishop and the high bailiff.

Persia—Beyond a local telephone system in Teheran in the hands of a Russo-Belgian tramway company, the only telephone line in Persia is one between Teheran and Resht, which belongs to a Russian road-building company and is used only for their own purposes.

COVERED DISTRIBUTION.*

By A. MAGNALL.

WHEN agreeing to give a paper on "Covered Distribution," I had hoped that we would have had an opportunity of having more actual experience, but being called upon to open the session, and the proposals on hand not having fully matured, I am afraid you will have to be content with one's own opinions, instead of descriptions of actual practice.

I would like to call attention to the mistaken idea many have as to what is meant by covered distribution, and I regret to find there are many old and experienced servants of the Company who

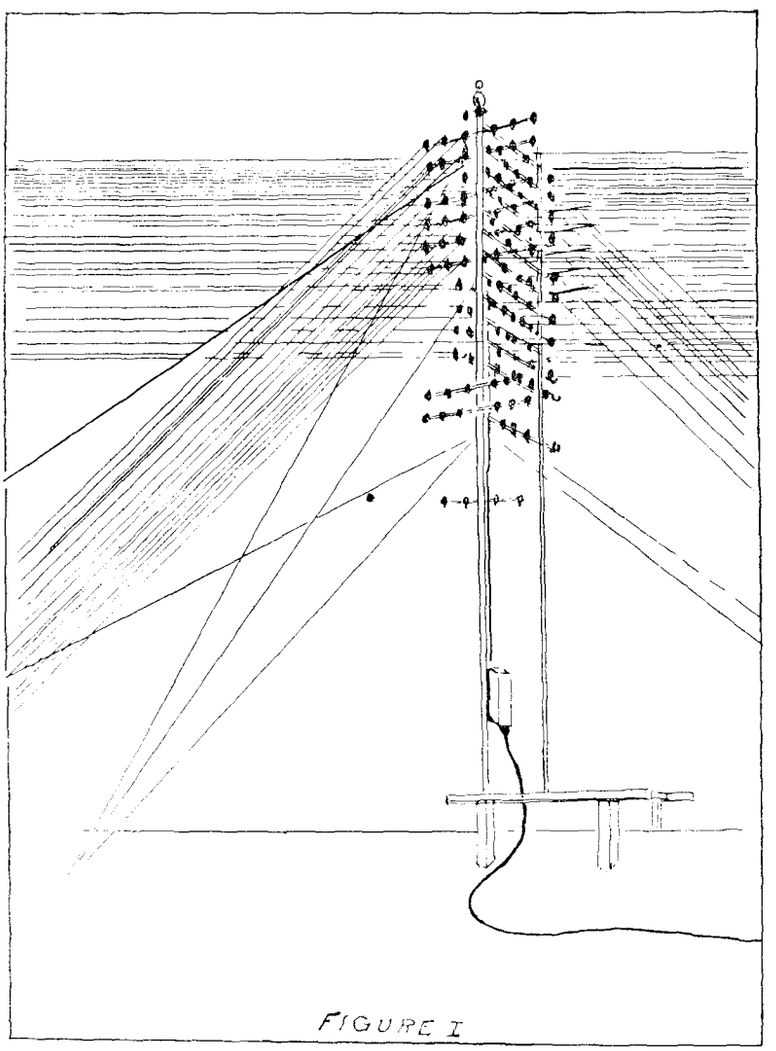


FIGURE I

consider it an act of retrogression, whereas, if they will but look into the matter fully, they will find that much work of the past could have been carried out cheaper and better with covered distribution than with open wires.

To look on an innovation with suspicion is, however, but a common failing, and perhaps it is well at times to be a bit backward and await events, but if we are to hold our own in any industry, we must always be on the look-out for something better than what we have got. If not better something equally good at less cost, and in my opinion we have in covered distribution something infinitely better and cheaper than distribution by open wires.

I have been long enough in the service to have at one period used nothing but No. 11 B. W. G. (200 lb. per mile) iron wire for overhead circuits, and to know that when 70 lb. copper was introduced, we, as workmen, took a strong dislike to it, as we had

* Paper read before the Manchester Telephone Society, Oct. 26, 1906.

been so accustomed to the heavy wire. We were continually breaking the copper wire down, either by damaging with plyers, making kinks, or attempting to stand on it, we also did wonders by burning the wire with the soldering iron, for we commenced using the copper as we had the iron wire, *i.e.*, when making off, we put a tail or butt on the insulator; the result was, it was a common occurrence for a broken wire with a draw vice at the end of it to pass far too close to one's head to be pleasant, owing to the wire becoming soft when the joint in the line was becoming soldered.

The same again occurred when bronze wire was introduced; the cry was, it is too light, too brittle, too springy, etc., etc., for it was more often let off the coil by hand than off a drum, and the result was that when the wire broke, it would come back nearly to the starting point like a coiled spring.

I merely give these few facts to show the prejudice there is there is against new methods, and as an illustration of how necessary it is to be for ever on the look-out for improvements, for it is

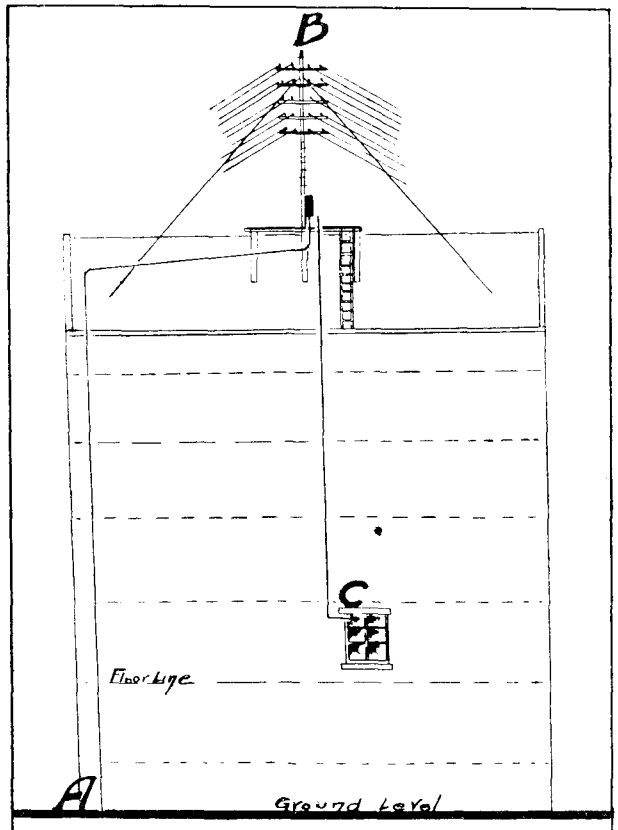


FIGURE No 2.

beyond doubt that it would have been a practical impossibility for the telephone business to reach anything near its present development had we been obliged to stick to iron wire for overhead work.

Covered distribution has many advantages. It admits of a larger number of wires being dealt with than is possible by overhead work. It brings down faults to a minimum, it is, like for like, less costly than overhead work, consequently more efficient.

As an illustration of efficiency and sound practice, at the same time making use of the existing plant, I venture to submit the following:—

Take the case of a pole line which has been up a few years. The development has exceeded expectations, and it is found that the poles are too low to carry the additional wires. What happens? The local man puts in a taller pole here, a taller pole there, and so on; when he has finished he finds he has a heavy and troublesome open wire route. If he had studied a scheme for cable before putting up taller poles, he would have erected a lead-covered cable on his existing poles, and would have had considerably increased capacity, efficient plant both electrically and mechanically, and probably at a cost little above the value of recoveries.

It is of course very easy to generalise and not lay oneself open to much criticism. I will therefore now confine myself to a comparison of a lay-out of covered distribution in a given block, and as it is now served by open wires.

Fig. 1 is a photograph of an existing double standard on the roof of a warehouse which is fed by a 153-pair cable from the exchange, led up from the street to the standard in the common way by cleats to the wall.

To glance at such a photograph is to me only to realise the dangers we are constantly subjected to by so much open wire, for no matter how close the supervision might be, we cannot control gales, fires, actions of others, etc., etc.

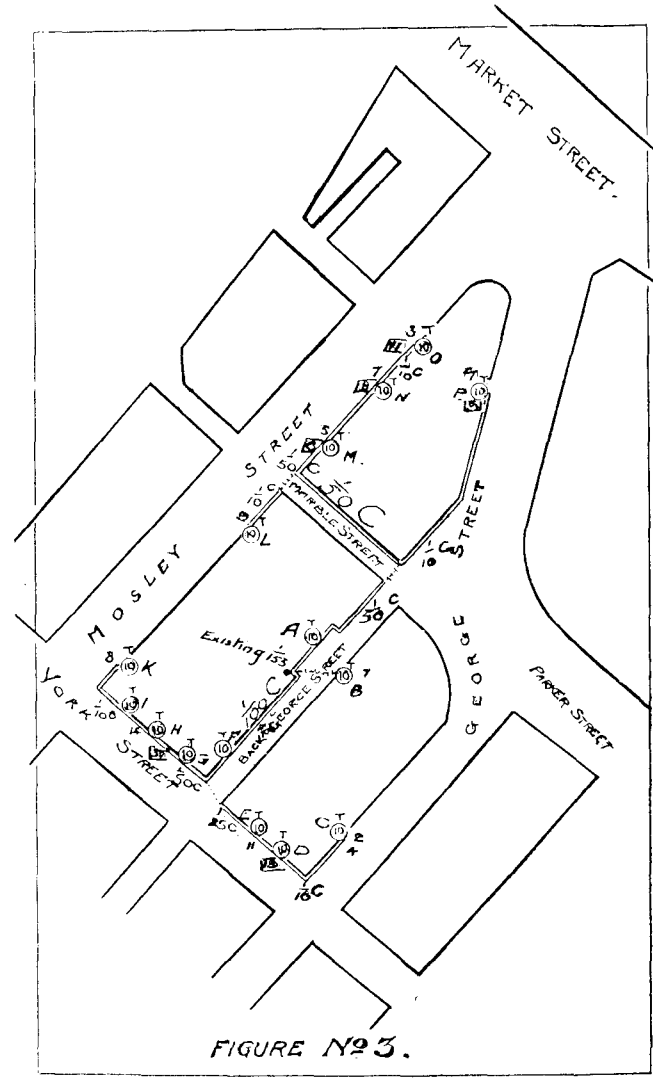


FIGURE No 3.

Only the other day, close to this place, an insulator fell through a plate-glass window, and had the clerks who usually sit close by not been out at the time, the result might have been fatal. We have at this moment a claim for damage done by water at this very place.

Fig. 2 is a plain diagram of the standard and cable, as shown in the previous photograph, together with a leader.

It is to this diagram I wish to call your special attention, and I am sure you will agree that it is absurd to continue our present method of construction in many places.

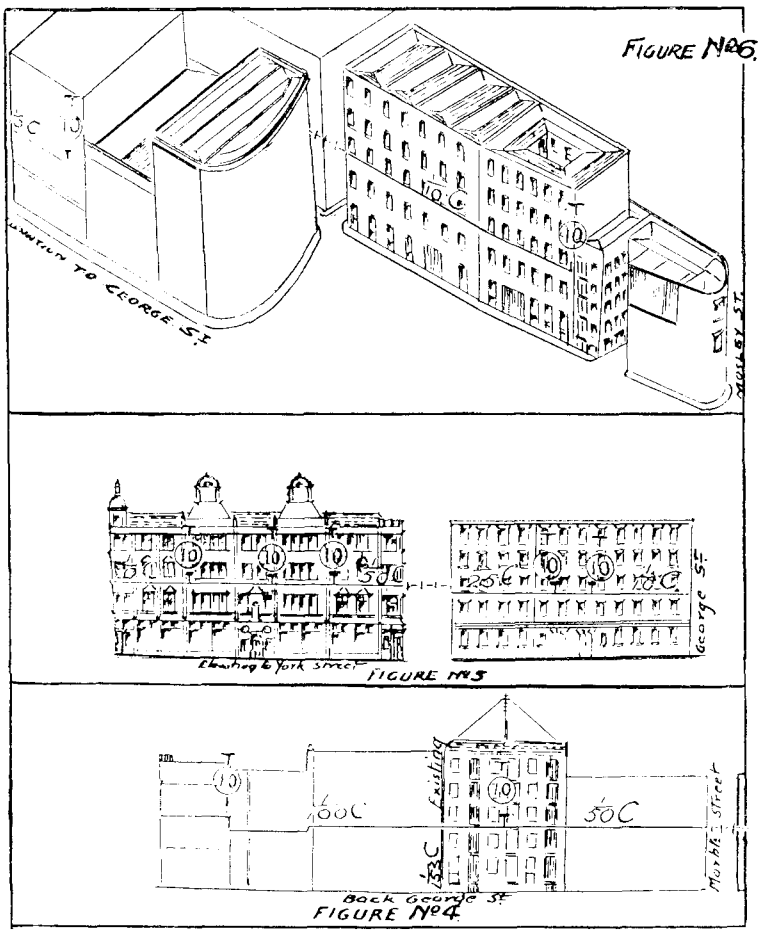
From observation it has been ascertained that in this block the average leader will reach the first floor, but to be on the safe side the leader is shown on the second floor. Now, what happens? The circuit leaves the ground at "A," goes to standard "B," thence back to the window "C"; therefore the double circuit is waste material between "B" and "C." With covered distribution the circuit would be tapped at "C."

The first object of an engineer is to make his line as short as possible, then to subdivide it so as to have as little leader as is possible, therefore as lead-covered paper cable is the cheapest and most efficient cable at our disposal we must take the lead-covered cable as close to the subscriber as is practicable; this means a much larger number of terminal heads or distributing points; but as reliable, simple and cheap terminal boxes are now available, they are to be encouraged.

Fig. 3 is the ground plan showing the lay-out with the covered wires in place of the overhead. It speaks for itself. The references are: Ten represents the total offices or rooms in this particular part of the block of buildings. Three number of existing subscribers, $\frac{1}{10}$ C one 10-pair cable, and 10 T one 10-pair terminal head.

It will be noticed that provision is made for all existing subscribers, and an attempt made to provide for a reasonable future.

In this scheme the wires at each terminal are shown as direct; this is not however applicable to all conditions; take for instance

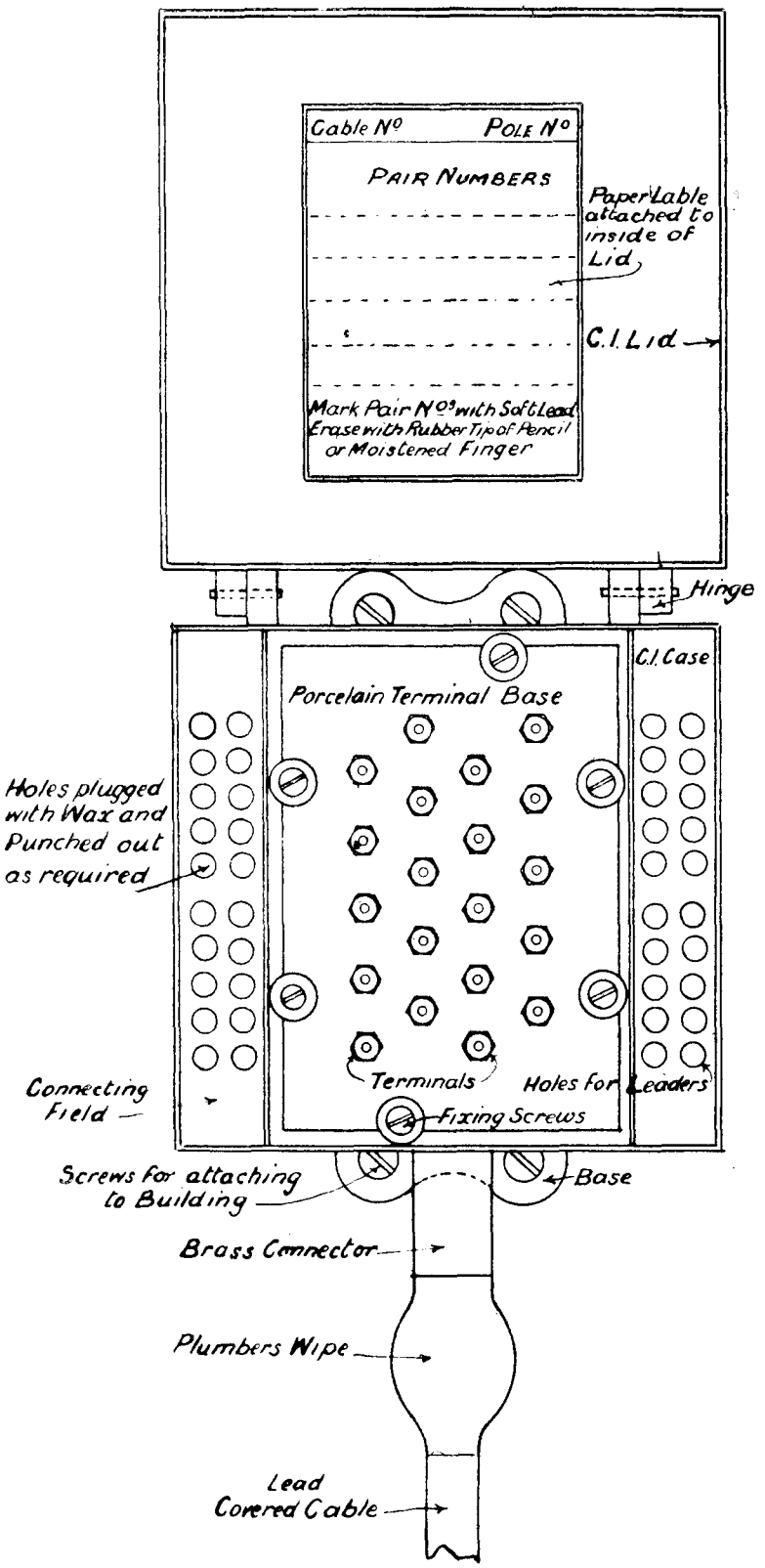


a block where there are a number of party lines. After a careful study of the existing and likely subscribers, it might be found better to connect some of the circuits up in multiple, say, those at N and O, or O and M, or two pairs might be in multiple, L M, N and O, and the remaining eight direct, but as there is no general formula for these combinations, each distribution scheme must be laid out on its merits after due consideration.

Figs. 4, 5 and 6, show the elevations of the buildings, also the lay-out, with the positions of the terminal heads and runs for cable and leader.

You might say "Yes! it looks very pretty; but what will the property owner say?" My reply is, that a lay-out of this kind with proper workmanship, can be installed far more neatly than eaves brackets, S. A. cups, &c.

This brings me to the detail work. The runs for the cables and leads must be carefully selected, and with a view to being as inconspicuous as possible; at the same time the terminal heads, &c., must be easily accessible, but free from likelihood of mechanical damage.

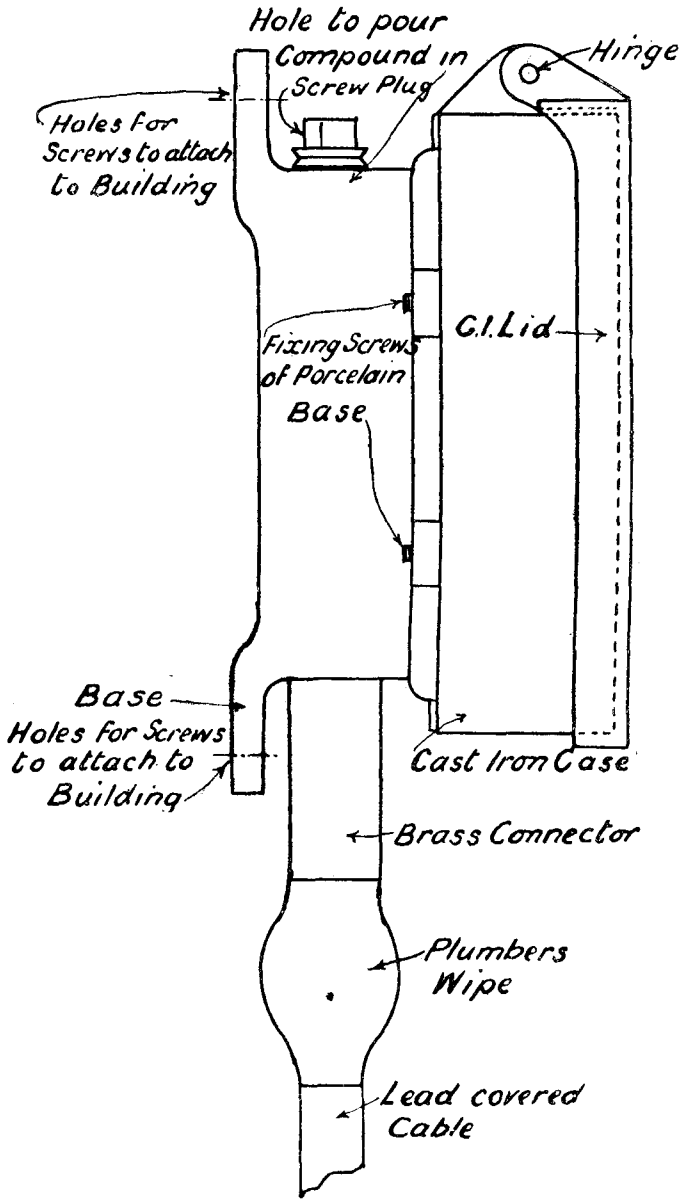


— FRONT ELEVATION OF BOX —
— (WITH LID OPEN) —

All runs for the leads or cables themselves, should be vertical or horizontal, as nothing looks worse than wiring done at all manner of angles.

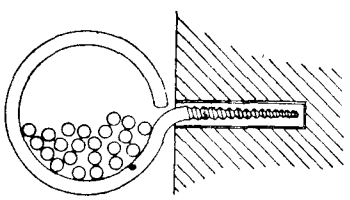
Fig. 7 shows the terminal box. This has been under test for some time and found to be satisfactory.

With regard to the service wire or leader, this is to be led from the terminal box to the subscriber's office by means of galvanised iron rings, the rings to be fixed about 3 feet apart, or less, as may



SIDE ELEVATION OF BOX

be required when dealing with corners, angles, or obstructions. These rings are fixed by being screwed into a small lead expansion sleeve which has been previously let into the wall.



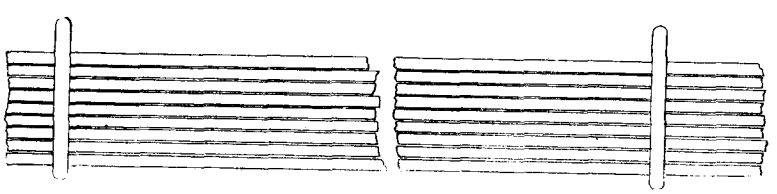


Fig. 9 shows a ring fixed with leaders threaded through.

I should say that one of the secrets of sound covered distribution is care to avoid damage from all sources.

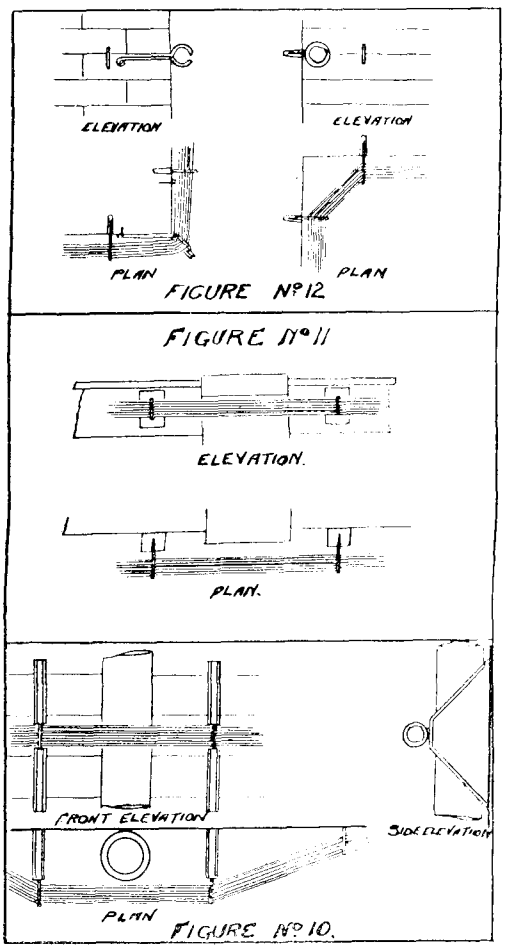
There are many little causes of damage which one might mention, but as a long discussion is desired, I show a few only, viz.:

Fig. 10.—A method of passing a rain-spout.

Fig. 11.—A method of passing a brick column.

Fig. 12.—A method for passing a right angle.

Before closing, I would just like to say a word to encourage all members of the staff to bring forward any little point which may occur to them in practice. It is astounding the number of men who have *thought* of improvements, and let it stop at that, only to find later that someone else has brought forward the same thing, much to their own benefit and to that of the trade or profession to which they belong.



Only the other day I was glancing over an American journal when I came across an advertisement of a trolley for facilitating the erection of aerial cables, and there is in this room now a gentleman who some twelve months ago conceived an idea for similar work and made models of apparatus after the same style of that now in the market.

Those who actually carry out given works are the people who can make a success or failure of any scheme, and I advise all those who think they can effect an improvement, no matter how small it may appear, to put forward their suggestions.

I think it was MICHAEL ANGELO, who said to a friend, who laughed at the great attention the artist paid to his work, "Remember that these trifles make up perfection, and that perfection is no trifle."

THE TELEPHONE APPRECIATED.

THE following appears in the *Daily Record and Mail* (Glasgow) of Dec. 19:—

"The telephone has had many cursings in its day, and, as this is Advent season, perhaps you will permit me space to bestow upon it a blessing!

"For two days last week I was confined to the house with a severe cold, and was prevented visiting a sick room in a nursing home, where both duty and inclination called me. It was during these two days that I blessed the telephone. No possible substitute could have taken its place!

"Glasgow. A SUBSCRIBER."

THE PUBLIC COUNTER.

By H. H. KILBY, *Birmingham.*

IT is at the office counter that the general public are often first brought into contact with the officials of the Company, and as first impressions are lasting, and in this case must exercise a great influence in giving the Company a character for businesslike methods or the reverse, a few words on the subject may not be out of place.

Up to the present there has been no reference made in the JOURNAL to what is a very important part of the Company's work, viz., its dealings with the public across the counter. While it is an all important point to see that the caller receives prompt and businesslike attention, it is more important still that proper courtesy should be shown to *everyone* having business with the Company.

From my own experience, and doubtless it has been the experience of others in the service, it has been noticed that different callers receive varied treatment at the hands of those responsible for attending at the counter. What I particularly have noticed is that a person whose attire is perhaps of better appearance than another's, is treated with more or less deference, according to his dress. This certainly should not be the case if the office has the interests of the Company always in view.

Another practice that is very objectionable, is to send a small boy, whose head probably is just visible above the counter, to enquire after the caller's requirements, and the boy—in most cases being perhaps just from school—only succeeds in annoying the caller either by misunderstanding his needs, or by asking him to "take a chair" and then forgetting his existence.

I have in mind a case where an important municipal official in a very populous town (the council of which had always to be handled very delicately) called to see the district manager. The latter was absent on business and was not expected back for an hour or more, but the small boy in charge of the counter asked the gentleman to "take a chair," fully satisfied that he had done all that was necessary. After "cooling his heels" in patience for a quarter of an hour the caller ventured to enquire of an official when he could see the district manager, and his annoyance and astonishment can be imagined when he was informed that the latter would not be back for probably a couple of hours.

Again, how often it happens that a subscriber calls in the heat of his wrath (after having made an abortive attempt to use a telephone which has either developed a fault) and is waited upon by some inefficient junior having no tact or discretion at all, who only aggravates the subscriber still more by the indifferent attention he gives to the complaint. Many enemies to the Company are made in this manner.

Then there is the caller who cannot get at the official who can best deal with his requirements, but is bandied about from one official to another (having perhaps to repeat his story several times simply because the first man or boy he sees is either without the knowledge he ought to possess as to the different departments and their work, or will not take the trouble to see that the caller is promptly referred to some responsible officer.

Another aspect of this question is the counter which is always more or less used as a desk, and on which one can see either the Company's books thrown open to the public view, or correspondence left lying thereon for "all and sundry" to peruse. Again, in many a district or local office there can be seen the Company's advertising literature thrown about on the counter in any condition, much of it being used as "scrap," either by callers or the staff attending to callers' wants. Surely it is not asking too much of the office staff to see that the counter is kept tidy, and a couple of pens, a filled inkstand, and some clean blotting paper provided thereon. The public appreciate these things and think better of the Company for such small attentions. Smartness is not only a good advertisement but reflects credit on those immediately responsible for it, and it never goes unnoticed. What a pleasure it is to go into an office having a clean, tidy appearance, and to be waited upon by a pleasant-spoken, businesslike official; and how disagreeable is the impression caused by the dirty, untidy office, with various stores, books and stationery lying around anywhere, while the limit of patience is reached when one is addressed by an uncouth, gruff clerk, whose usual greeting to a customer is the one word "Well," or by someone who at a glance is seen to be incapable of attending to one's requirements. In the former case, if the visitor is a would-be subscriber he is probably so pleased with his surroundings that he is straightway persuaded into joining at a higher rate than he had intended, while in the latter the probable customer probably becomes an enemy for life of "that Telephone Company."

While not, strictly speaking, coming under the heading of this article, I should like to draw attention to the great advantages which I feel sure would accrue from the equipment of private branch exchanges in all the larger district offices, the branch switchboards to be worked in view of the public as is done in some of the large hotels and offices in America. I cannot help feeling that this would prove an effective and paying advertisement for the Company, especially in view of the vigorous efforts now being made to impress the advantages of this system on the public. It is a much-needed want in the larger district offices, particularly where contract departments are established and where most of the departments and officials are scattered over fairly large buildings.

THE TRAINING OF STAFF FOR THE ELECTRICAL DEPARTMENT.

By WILLIAM ALLAN, *Chief Electrician, Glasgow.*

"No telephone company would think of putting in a switchboard with only sufficient capacity to serve the subscribers who had contracted for lines at the time the equipment was ordered. No more would any competent engineer lay out a system of conduits provided with so few ducts that it would become necessary to tear up the street every time a few more subscribers were secured; but when in many companies the organisation of a force to handle this expensive plant and see that it is well kept up, and wisely used, is taken up, there seems to be a falling away from the principles applied to investments for inanimate equipment, and instead of exercising a proper foresight the management is often inclined to let things take care of themselves.

"Everyone who has gone far in the work knows that the telephone business is no simple thing to understand; there are a great many branches, and before he can have even a general understanding of them all, a man must not only be provided with good mental equipment, but he must put in a considerable number of years of good honest work.

"The difficulty of obtaining a sufficient number of good men to handle the work which is being done at the present time should be a strong argument in favour of providing for the future.

"The only way in which this can be done is by a deliberate setting aside of a certain amount of money for the training of men. If this is done, and the training course or the range of experience is of the right sort, the company need have no fear that a few years from now it will suffer a reduction in earnings through lack of a force sufficiently able to handle its business.

"Methods of obtaining the right sort of men, training them in such a way as to make their natural powers develop in lines which will be most useful to the company and creating an interest which will cause them to adhere to the organisation in which their knowledge and experience has been gained, deserve the careful consideration and action of the broad-minded manager. . . ."

No apology is made for the lengthy quotation which has been given as an introduction to the subject of this article; it contains many of the arguments which justify the suggestions made for specially training sufficient staff for the electrical department. The need for a large number of thoroughly well-equipped men for the electrical work becomes daily more pressing all over the country. The equipment and maintenance of telephone plant is a very specialised branch of electrical engineering demanding the very best a man can give, even when assisted by the very best training that can be given him. Until this is accepted as a truth, and thoroughly lived up to, the work of the electrical department throughout the country will not reach the high standard of efficiency requisite to maintain a uniformly efficient and reliable service.

The first essential is that only the right class of lad be accepted for training in the electrical department, as no amount of training will make amends for the initial error of taking the wrong material to work upon. It may be admitted that it is extremely difficult to know how the lad fresh from school will turn out; but it is the lad whose mind has shown a bent towards mathematics and mechanics who will most likely best repay time and trouble spent in training for telephone work. It must always be borne in mind also that although the sound mind, and the right kind of mind, is an important consideration, the sound body is also of consequence; a lad of weak constitution is certainly not the lad who should be started on a career as a telephone electrician. In addition to a searching enquiry as to the lad's character and early training, there should be an entrance examination specially designed to test the progress the lad has already made, more particularly in mathematics, and unless he is found capable of answering, with an efficiency of say 90 per cent., some simple questions in arithmetic and algebra (as far as simple equations) he should be disqualified. A satisfactory school certificate might be accepted as sufficient proof of his general education. No lad under sixteen years of age should be accepted under any circumstances.

When candidates have been accepted and have passed the qualifying examination they should be placed under the control of a special officer, whose duty it would be to watch the career of these lads in all sections through which they pass, and from time to time to test by special examination the progress they have made; he should also direct their studies in technical classes. Although examinations are apt to become more or less stereotyped and hardly show the full capabilities of any candidate, still they may be made to give sufficient indication (along with other sources of information available) to enable one to judge whether a lad is likely to be worth further expense in his special training.

The special training officer should have a properly equipped workshop assigned to him, in which the lads would be under his control during the first six months of their training. There they should have a thorough drilling in the best methods of handling tools, and they should be shown how to take all classes of apparatus to pieces, the practical use of each part being explained. It might be possible to get a little remunerative work done by the lads during their term in this shop by letting them handle recovered apparatus and take it apart for the purpose of demonstration; then before re-assembling it let them clean up the several parts, so that the apparatus could be re-erected when required without further labour being expended on it; it should be made quite clear, however, that the matter of first importance throughout the time of training is not so much to get remunerative work done by the learners and save some other classes of labour, but to see that they are thoroughly instructed in the proper use and handling of apparatus and tools. While the lads are in the training officer's workshop he will be reasonably able to say at the end of six months, whether any of them should no longer be retained in the service, as he will have had an excellent opportunity of becoming thoroughly acquainted with their qualities.

At the end of six months the lads should be placed under an experienced instrument fitter (specially chosen for his personal character and efficiency) and sent round with him to gain an insight into the proper methods of fitting instruments, giving such assistance as they are able. At the end of three months the training officer would put them through a practical test of this section of the work, certifying whether satisfactory knowledge had been gained, or if longer time should from any special cause be given to this section.

The lads would then be passed on to the switchroom, where for six months they would be placed under a first-rate construction man (again specially chosen, as in the case of the instrument fitter). Here they would have an opportunity of watching the methods of erecting and wiring switchboards, testboards and power plant, doing little practically themselves, but rather seeing how the work is done; then during another six months they should be set to the actual handling of cables and erecting of apparatus, care being taken to see that they gain skill in following the connections from diagrams. As switchboard apparatus and wiring are so much more complicated than any other part of the plant, the full twelve months will probably be the very shortest time advisable to allow on this section. When this time has expired their knowledge will again be tested by the training officer, who will certify the progress made and the necessary action to be taken in case it should prove unsatisfactory. Assuming that the progress to this point is found satisfactory, the lads should then be sent back to the switchroom for another six months and set to the clearance of switchboard faults, their nature, probable cause, and the best method of localising and clearing them, being carefully explained to them by whoever is in charge. From this duty they should pass to the testroom where they would be initiated into the ordinary routine work of testing, the use of instruments for making insulation and other tests, and the keeping of records and checking the work of inspectors and faultsmen. At this point they would come more specially in contact with subscribers, and care must be taken to instil into their minds a proper idea of the line of conduct in speech and manner, which it is expected representatives of the Company should follow in their dealings with the Company's clients. After three months thus spent, they should have six months on instrument faults; here they will, for the first time, be left more or less to their own resources, and at this time instructions should be very carefully given in all that pertains to the relationship between the Company's employees and the telephone users. A comprehensive test of the all-round knowledge and capabilities of the apprentices should then be made by the training officer, and it would be his duty to report whether the young men were now fully qualified for entry on the permanent staff of the electrical department.

Throughout all these stages, if the training officer should certify that at the end of the specified period proper and reasonable progress had not been made, it should be clearly understood by the apprentices that they must lose any increase in pay which might apply at the end of such period, remaining at the lower rate until able to qualify for passing to the next stage.

The course of practical training suggested may be summarised as follows:—

In the workshop	6 months.
With experienced instrument fitter ...	3 ,,
In the switchroom	18 ,,
In the testroom	3 ,,
On instrument faults	6 ,,
Total	3 years.

In addition to the practical training, the apprentices would be required to attend such suitable classes at the Technical College as might be available, and also take the Company's own Correspondence Classes as in the Mathematics, "A" and "B" Courses. These classes might be arranged for the three years somewhat as follows:—

First year: Correspondence Class in Mathematics, and 1st Stage Magnetism and Electricity at the Technical College.

Second year: Correspondence Class "A" Course, and 2nd Stage Magnetism and Electricity at the Technical College.

Third year: Correspondence Class "B" Course, and "Honours" Stage of Magnetism and Electricity at the Technical College.

It might perhaps be advisable to introduce some further study of mathematics in the second or third year, but if, as has been suggested, the Correspondence Class papers in mathematics were divided into two courses, the taking of the second set of papers in the second year might meet the requirements of the case.

After having passed through the three years' course, and been put on the permanent staff, it would be compulsory for the officers to take the Correspondence Class "C" Course papers during the first year of their appointment.

Unless the apprentice can show results entitling him to 50 per cent. of the total possible marks obtainable in the respective classes chosen, he must be regarded as unsatisfactory, and should not be retained. In order to make quite sure that the work in connection with the classes had actually been done by the lad himself, a special examination should be held in the work of the correspondence classes as is done in the Technical College; as if only the

marks obtained in reply to questions to be answered at home were to be considered, it is possible that such assistance might be given in the writing of these answers by others as would enable the lad to obtain the required percentage of marks without his having gained anything but the most superficial knowledge, indeed, by the assistance of one smart lad all the others in a district might get through. It would therefore be necessary to have an examination so conducted as to preclude the possibility of the lad having any assistance from others.

In order to induce lads to strive after a higher standard of attainment than that absolutely required to pass, it is suggested that a bonus of 1s. per week be given during any one year when over 65 per cent. of the marks possible have been obtained in the classes, and a bonus of 2s. for over 80 per cent. With young lads the immediate prospect of reward is a stronger inducement to hard work than the more distant advantages of improved rank in later years. The question of the remuneration to be given during the three years of apprenticeship is not one of vital importance. If the apprentice could feel sure of finding himself at the end of three years in a position commanding a fairly comfortable pay, with the prospect of advancement to more lucrative appointments in riper years, a small pay during the years of apprenticeship would not be a bar to obtaining as many lads of the right sort as were required. As the number under training would be only that required to make sure that properly trained men were available to fill each year the vacancies that arise, the assurance might readily be given. The further point to be considered is the place where the lads should be brought together to be trained. This is an important item in the general scheme. Having due regard to economy and efficiency, it would seem that the training centres must be at the larger centres of each province. In these larger centres there would be available the greatest variety of apparatus for purposes of demonstration. Also in the larger centres the facilities for technical education will naturally be greater than in small towns.

The success of any such scheme as has been outlined must depend, first, on the care taken in passing candidates to make sure of obtaining the proper type of lad; second, on the choice of the proper man for the position of training officer; and third, on the choice of the best men available, in each section of the work, under whose control the lads will be placed at the successive stages. In each of these cases the warning to "choose well, your choice is brief yet endless" should be well heeded.

In the satisfactory working out of the scheme the training officer would have the most influence, as he would come in touch with the lads at the end of each term when examining them on the progress made, and it would be well that he should also, while the classes are in session, supervise their studies by meeting them at least one evening in each week, when any special points requiring explanation might be brought up and difficulties cleared away. The lads are at an age when example has much more to do in moulding their characters than any amount of precept. The instilling of knowledge into their minds will be best done by offering it in such a way as will make them eager for more, rather than by endeavouring to force dry hard facts, as it were, down their throats without any attempt to make the dose palatable, by offering it in such fascinating guise that their attention will always be held as may be done where the instructor is himself interested in his work, and has sufficient enthusiasm for it as to make all he says and does both interesting and instructive.

RESTORING FIRE DAMAGE.—A BIT OF A RUSH AT PAISLEY.

By A. R. LAMB.

WE have had our trial by fire at Paisley and have come through the ordeal not entirely overwhelmed, in fact there is a pretty general feeling that for the valuable experience gained we are, perhaps, more to be envied than sympathised with.

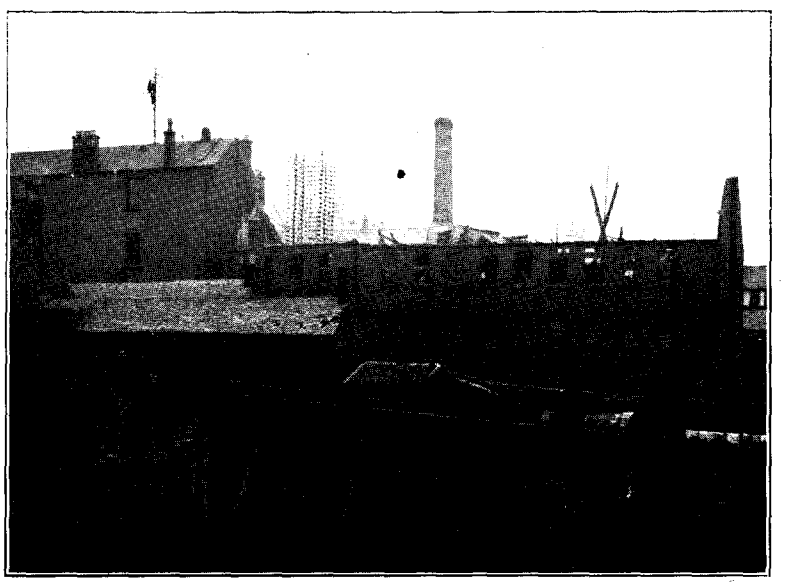
The work of making good the damage has been so interesting, that I am constrained to send a short account of it to the JOURNAL, in the hope that it may prove readable to telephone men elsewhere, whether they may or may not have had a similar happening of their own.

On Saturday, Nov. 11, about half an hour after midnight, the local manager at Paisley was aroused by a policeman with the laconic message, "Your place in the High Street is burned down." As our "place in the High Street" is the Paisley Exchange, with over 800 wires of various kinds coming into it, this was somewhat alarming, and the local manager made all haste to the spot.

On arrival he found that the officer's tidings were, if not absolutely correct, quite near enough for all ordinary purposes, the position being that while the exchange proper was not on fire the building immediately adjoining, on which our main standard stood, was burning fiercely and the outside plant clearly "a gone case." Fortunately there was a plentiful supply of water, and by playing steadily on the party wall between the exchange and the burning building and on the leading-in cables, the firemen succeeded in preventing the flames from spreading to the switchroom and testroom.

The local manager finding the trunk lines still available, the post-office junctions, by a fortunate chance being led in by a back door, as it were, rang up my house at Gourock and told me what had occurred.

Gourock is about twenty miles from Paisley and there are no trains at three in the morning, but with the aid of my bicycle, I got to the scene of operations by the time the firemen had everything well under control, and it could at once be seen that so far as we were concerned the damage was outside alone, all our external plant being destroyed with the exception of one cable, while all our inside apparatus was left intact.



THE BURNED BUILDING ADJOINING THE PAISLEY EXCHANGE

The first thing done was to call out the staff, and get the open wires which were overhanging the electric car lines cut away. This done we made a survey of the surrounding standards—the spans between these and the exchange were all down—and decided what must be done to get the damage made good with the least possible delay. It was apparent that a standard similar to that which had been destroyed was out of the question, and we therefore made up our minds to erect a single pole on the roof of the exchange and run out aerial cables to the surrounding poles, six in number. We got the number of lines on each route, and then made a note of the sizes and lengths of cable which would be required.

The provincial superintendent had been informed by telephone of the occurrence, and by his instruction a circular was drafted advising all the subscribers of the breakdown, and asking their kind indulgence while the necessary repairs were being made. Being Sunday all business premises were closed, but necessity knows no law and a daring telephone man having discovered by calling at a local printer's house that the good man was at church, followed him there and dragged him forth to put our requirements into print, which he did with so little delay that every subscriber received his intimation by first post on Monday morning. The work of addressing envelopes was smartly and willingly done by the

operators, whom we called out by special messenger, and I take this opportunity of putting on record my appreciation of the good work accomplished by these young ladies. Without their assistance we could not have got through all that we did on the Sunday. Meantime the outside men were clearing the routes from the burned standard, and running out steel suspender wires from the new roof pole on the exchange to the surrounding distributing poles so that cables might be erected when these came to hand. The electrical staff busied themselves getting the testboard cleared of the burned cable ends, sweating the wires off the arrester strips and cutting out the old jumpers.

With a note of what cables and other stores we would require I rang up Mr. VALENTINE, District Manager at Glasgow, to ascertain if he could supply me from his stock, as, if this could be done, a lot of time would be saved as against what would be needed had we to get everything from London. Mr. VALENTINE had just gone to church when I got through to his house, so I next tried for Mr. GILBERT, Chief Engineer at Glasgow, and I was more than delighted to find him not so much "on religious thought intent," but at home and ready to do all he could to assist. With Mr. GILBERT'S kind aid it was found that Glasgow could give us almost all we needed both in material and men, and as much as possible was sent off there and then, the balance being despatched first thing next morning. All hands at Paisley worked straight through Sunday night getting ready for the big work next day, and when the Glasgow men came on the scene very early on Monday morning, we were able to go right ahead without delay. Mr. WARNOCK, Chief of the Jointing Department in Glasgow, came down with a squad of twelve of his men, and they lent invaluable assistance. First of all I got the various responsible men together, and we talked the matter over and arranged our plan of campaign. Mr. AUDSLEY, Local Manager at Paisley, Mr. LEITHHEAD, Chief Inspector, Mr. ERSKINE, Acting Manager, Mr. WARNOCK, from Glasgow, and Mr. WILSON, Chief Inspector at Greenock, who was called up to lend a hand, formed, with myself, the committee of ways and means, and we speedily decided what we were going to do and how to do it. I would here like to say that to each of these officers all praise is due for their unwearied exertions. Double shifts of the testroom staff were arranged, so that the work might go on continuously night and day, Mr. LEITHHEAD taking charge during the day and Mr. WILSON at night. Outside the work was supposed to be suspended of necessity after dark, but it was found on Monday when the daylight gave out that time was far too precious for us to stop, and we drove on with what light we could get from the electric street lamps, eked out by half a dozen oil lamps hung up on the roofs where the men were working. No double supervision was arranged for the outside men, nor double gangs, but Mr. WARNOCK and Mr. ERSKINE seemed above such trifling requirements as intervals for slumber, and the men followed their example heroically. Certain it is that the jointer's squad, after working till midnight on Monday, started at seven on Tuesday morning, and did not knock off till five on Wednesday afternoon, by which time their job was done, and they went home to Glasgow, and, I trust, to bed. All the work went very smoothly, and we were fortunate in having the experience of the Glasgow Royal Exchange fire to guide us in our operations. A copy of the JOURNAL for April, containing Mr. WATSON'S article on the "Royal" fire, was brought down on Sunday by one of the staff, and we got lots of "tips" from it which were of great assistance.

Our friendly printer made us cards similar to those Glasgow used (though our testboard being intact, we did not have a line reading "Test jack connected"), and we found these of the greatest help. On the cables we only made pot-heads at the outer ends and in the testroom stripped back the lead for about four feet, and gave the paper-covered wires a bath of hot beeswax, thereafter forming them direct on to the arrester strips. We used ordinary cheap white cotton tape for lacing, and this served a double purpose, as we gave it a soaking in the hot wax before using, and it acted as an insulation and protection for the paper where the cables ran up alongside the arresters. We had all the cables run out by Tuesday night, and when they were in position we numbered out from the board, and every lead was traced and identified before we joined through to the subscribers' wires on the poles. This, I think, an improvement on the Glasgow plan of joining through at once, as we were never at a loss to find a lead on the poles, and in addition we have all our spares ready for use at a moment's notice. When the numbering out was completed, the work of joining through was gone on with at once, and we got connections working steadily thereafter.

On one of the old cables which was found not to be irretrievably damaged, we got the first subscribers joined through, and by Tuesday night we had 140 working, as well as five junctions to sub-exchanges in the area. On Wednesday we had 313 through, and on Thursday 470, while by Friday night the damage was practically made good, only a few stray cases being left to be dealt with, such as private lines which came in and out of the old standard, external extensions, and sundry subscribers from whom no reply could be got after we had joined through, and which were afterwards found to be disconnected either from instrument faults caused by high tension currents from the trolley lines or from broken wires beyond the distributing poles near the exchange.

THE EXCHANGE STANDARD RESTING ON THE SECOND FLOOR.

Our subscribers were very considerate, and gave us little or no trouble. We had no accidents of any kind, although at the time when the fire was at its height, and broken wires were falling across the trolley lines, several spectators had narrow escapes. Quite a number of firemen and general onlookers, who attempted to clear odd ends of copper and bronze hanging from the tramway lines, were seen performing evolutions which would have earned them big salaries on the stage as exponents of ground and lofty tumbling, but nothing really serious was reported.

Some photos of the burned building were taken by Inspector ELLIOTT, of Paisley, and two or these are reproduced. No. 1 shows the general outline of the damage; the building on the right, which lacks the roof, being the actual scene of the fire. It formerly was

the same height as the portion on the left which carries the single pole standard we put up on the Sunday. The old square standard may be seen still standing *in* the wrecked building, and it is peculiar and interesting to observe the way in which it has fallen. Although it came down two floors, now resting on the second floor instead of on the roof above the third, it did not lean over but simply sank down, keeping almost perpendicular. It would, I believe, have gone right through to the ground had the support of the cables been wanting, but when the fire was extinguished the standard remained hung up to the wall on the left by the cables and stays which can be clearly seen in photo No. 2. No. 2 gives a closer view of the old standard, showing its almost perfectly upright position. The standard must have jumped considerably when it fell, the poles being quite three feet from the chairs.

INSTRUMENT DEPARTMENT SUPERVISION.

By J. T. TATTERSALL, *Local Manager, Hull.*

THE article in the July JOURNAL by Mr. WRIGHT on this subject was of great interest, and it suggested to me that the following notes might be useful.

It is necessary that the responsible officers should know how the inspections and faults stand at the end of a given period, and to get the information condensed as much as possible the accompanying summary is kept at Hull. The summary is for one month's working, and since bringing it into use it has been found to be of the greatest assistance; the time spent in keeping it is only small if the work is done methodically.

Below I have enumerated a few of the advantages of the form.

It is a *resumé* of the month's work done by each inspector and enables the chief inspector to check the work of all.

Columns 1, 2, 3, 4 and 6 explain themselves.

Column 5.—With an up-to-date wire chief's table and a good manipulator this column should be kept low and, if this is done, a great saving in duration of line faults is the result.

Column 7.—This is an interesting column and the result can vary considerably.

Column 8.—One of the most important factors and calls for careful supervision.

Column 9.—If a district is neglected this figure soon develops.

Column 10.—By comparing with column 3 this figure gives a good idea how the half-yearly inspections stand.

Columns 11 and 12.—These figures are necessary to enable one to get at the actual work done by each inspector.

This summary also includes number of line faults and their duration, and the number of switchboard faults and their duration.

It will be observed that the centre is divided into districts, and that one inspector deals both with faults and inspections, thus being entirely responsible for the district.

The inspector working district 7 deals with private branch exchanges and a limited number of sub-exchanges.

The inspector working district 8 is solely responsible for automatic boxes. Since commencing this arrangement the results have been very satisfactory in reducing faults, ensuring closer supervision of automatic boxes and prompt clearing of faults. The keys are also in charge of one inspector only.

INSTRUMENT INSPECTION.

1	2	3	4	5	6	7	8	9	10	11	12	13	
Inspector's name.	No. of district.	No. of instruments.	No. of faults cleared.	Line faults entailing inspector's visit.	Found O.K.	Average No. of faults cleared per day.	Average duration in hours.	Per cent. of faults to No. of instruments.	Instruments inspected.	Journeys.	Average journeys per day.	No. of days worked.	Remarks.
	1	1,201	41	5	41	1·78	3·20	3·41	219	223	23	23	This district is overloaded and is being re-arranged. The density of the area demands shorter duration of faults.
	2	766	22	6	40	·95	2·4	2·87	118	117	13·17	23	
	3	843	22	5	22	1·00	1·65	2·6	129	168	15·72	22	
	4	799	12	9	29	·6	1·5	1·5	129	60	11·95	20	
	5	593	22	3	19	·95	2·8	3·7	105	181	14·34	23	
	6	634	26	5	23	1·24	3·15	4·1	204	54	14·85	21	
	7	254	21	...	14	1·61	3·28	8·26	138	36	16·07	13	Also deals with private branch exchanges and a limited number of sub-exchanges.
	8	347	50	2	33	2·17	1·8	14·4	125	40	10·86	23	Deals with automatic boxes.

Line faults, 203. Average duration, 2·9.

Switchroom faults, 124. Average duration, ·74.

Column 13.—Only working days counted, Saturdays taken half-day.
Column 12.—This average is obtained by including all journeys of every description made by inspector.

For valuing the duration of faults the time is taken from the actual time reported to the actual time cleared.

Recurring Faults.—All such faults reported during one month require special attention. These are entered in a book called the "28-day Fault Book." The chief inspector takes charge of this, and for each recurring fault a special form is prepared and this is not lost sight of until the trouble is entirely removed. This system can be highly recommended after a lengthy trial.

Whereabouts of Gangs.—The fault clerk obtains each day from the engineers a list of the gangs, and the localities in which they are engaged.

Reporting of Inspectors.—Where a "register operator" is not employed, each inspector rings up the fault clerk every half-hour. It is important that this should be done to ensure short fault durations.

Half-yearly Inspections.—To keep a check on these a small book is kept by each inspector who enters each subscriber as connected. Opposite the same, six columns are ruled representing six months, and when the inspection is done the date is filled in. Thus it can be seen at a glance whether everything is up to date. The book can be so arranged as to last more than one half-yearly period.

In comparing the summaries for one year's working they show a very satisfactory result, and it gives relief to know that improvements all round have been made which might have been absent had not the results been brought to notice monthly.

AMERICAN TELEPHONE ENTHUSIASM.

BY W. F. TAYLOR, *Contract Manager, London.*

IN the very interesting and instructive article on the above subject in the November JOURNAL, various good reasons are given to show why American telephone development is so much in advance of that in this country. While those reasons are pretty conclusive there is another which I think merits some little attention. It may be summed up in one word—*Enthusiasm.*

During a very short sojourn on the other side of the Atlantic last autumn, I was struck more by the spirit of enthusiasm which pervades the whole atmosphere of the telephone centres I had the privilege of visiting than by anything else I saw. Every man I came in contact with was an enthusiast; he thought, talked, and dreamed telephones; in his opinion there was nothing like the telephone business in the whole world, and he lived to make that business a success in whatever department he happened to be. He looked upon himself as a public benefactor, bringing within reach of everyone a time-saving, business-getting commodity, second to none in existence, and worth untold gold to the business man or housewife who has the good sense to have the service installed. So enthusiastic is he that he infects the public with a similar enthusiasm, and in this way his business increases a hundredfold. Did I find him satisfied with the splendid position his system and service have reached? Not by any means. He has 5 or 6 per cent. of the population on the telephone now, and he looks to have 20 per cent., and if my observation is worth anything he will most certainly get it.

There is, of course, no question that the telephone man in America has a different class of public to deal with than we have here. The American business man has seen the advantages to be derived from the telephone service and ungrudgingly pays for it, whereas the British business man thinks that as his grandfather and father got on without it, he can also; and that is the spirit we have to fight against. We must, if we wish to overcome the objections of our future subscribers, be fired with a little of that enthusiasm which has carried our American cousins into their present leading telephonic position.

I do not in any way wish to suggest that we have no enthusiasm among us here. There is, I think, plenty of enthusiasm in National circles, but to my mind it is not the all-pervading, white-hot sort of enthusiasm which struck me as being the outstanding feature of the American telephone man.

Possibly, as the writer of the article in the November issue suggests, the atmosphere has something to do with it, but I feel sure that the American spirit would overcome the atmospheric depression of these Isles, if it could not overcome the other and very severe difficulties the Company has to contend with.

I have heard it remarked by some of the staff that America is always being held up to them as a model to follow, and they do not see the reason, as they consider that we have done exceedingly well, and are going along nicely. I would say to all those who have this feeling, that they should take the first ship to America and make some enquiry into the telephone matters there; if, on their return, they are still of the same opinion, I for one shall be very much surprised indeed.

IT is regretted that in the GENERAL ELECTRIC COMPANY'S advertisement last month the number of "Robertson" lamps sold per annum was given as 50,000,000. It should have been 5,000,000.

AN ASPECT OF TECHNICAL JOURNALISM.

Extract from an address before the Schenectady Branch of the American Institute of Electrical Engineers, Oct. 5, 1906, by T. COMMERFORD MARTIN, *Past President, Editor of the Electrical World.*

No technical man can find outside his special class journal the right intellectual food—tough, indigestible, and badly cooked as most of it may be.

Now and again there is a book in the nature of a revelation, but the majority of the text books in our schools and on our shelves are years behind the latest things going. These facts the student, in college or out, must get from the technical press. Being often asked for the latest book on a subject I have been struck with the frequency, the invariability with which one's recommendation unavoidably carries with it a number of articles recently printed in the technical press.

When I meet a young engineer and discover that he has, unless for some valid reason, failed to join the national or local society of his branch of engineering, I find myself involuntarily putting a black mark against his name. When I discover also that he does not read regularly the journals of the art he becomes more hopelessly conditioned in my mind as one without professional pride and dignity, and as one who, on his own confession, does not keep himself so informed about progress that he can be properly useful in the world.

THE NATIONAL TELEPHONE OPERATORS' PROVIDENT SOCIETY.

THE first annual meeting of the above society was held at 58 and 59, London Wall, on Tuesday evening, Dec. 18, the president, Mr. J. F. Edmonds being in the chair. There was a good number of members present. The officers and committee serving for the past five months were re-elected for the coming year; Miss Minter being elected vice-president to fill the vacancy caused by Mr. C. W. Piggott's promotion to Birmingham. During the evening hearty votes of thanks were accorded to the auditors, Messrs. F. W. Hibberd, and C. E. Drabwell for their services, also to the collecting stewards, secretary, and chairman.

One or two slight additions and alterations to rules were duly proposed and carried; the proposal to revise certain other rules being postponed until a meeting to take place in the new year. Owing to the rapid growth in membership, and the corresponding amount of work in auditing, it was decided that a half-yearly instead of annual audit of accounts be made, and that the honorarium to the two auditors be increased from 2*s.* 6*d.* to one guinea per annum.

The secretary's and auditors' reports being read showed that not only is the society in a most flourishing financial position, but that the results during the five months for which it has been in existence, have far exceeded the most sanguine expectations. The present membership is 850, of which number 90 have received sick benefit. The division of the surplus funds has resulted in 83 per cent. of their contributions being paid back to members, the actual figures being as follows:—

		s.	d.
661	full members at	4	7
57	,, ,,	3	8
42	,, ,,	2	9
23	,, ,,	1	10
32	,, ,,	0	11

Representing a total amount of £171 5*s.* 7*d.*, and leaving, after ordinary expenditure, a balance of £8 18*s.* 4½*d.* to be carried on to next year.

These results can perhaps only be appreciated at their full value when it is realised that the surplus distributed is equivalent to 4*s.* 7*d.* being returned out of every 5*s.* 6*d.* contributed, thus making the nett weekly contribution for each member only a fraction above one halfpenny per week.

Should any provincial centre desire a copy of the balance sheet, or book of rules, the secretary, Miss E. Nichols, 9, Marshalsea Road, S.E., will be pleased to forward it.

CATERING COMMITTEES.

As a proof of what can be done by energetic committees and good management, coupled always with an economical cook, the following figures may be found of interest, and represent the profits made during the year 1906, at four of the largest Metropolitan exchanges, and distributed either as bonuses at Christmas or in "free meals":—

Avenue.—£53 11*s.* distributed in bonuses as under: One hundred and thirty-seven operators having received 100 dinners and over, 7*s.* 6*d.* each. Eight operators having received 80 dinners and over, 3*s.* 6*d.* each. Thirteen operators having received 50 dinners and over, 2*s.* each. In addition to which a free Christmas dinner was given to each operator on Dec. 21, the turkeys for which cost £4 10*s.*, and the total cost was £13 1*s.* 4½*d.* £2 9*s.* 6*d.* was given in Christmas boxes to kitchen staff and tradesmen. At this exchange a bonus of 2*s.* each was also distributed at Easter.

Gerrard.—Free meals for two separate weeks during the year to operators of over three months' service; the operators of less service receiving the week's meals at half rates. This represents a total return of 6*s.* in the year to fifteen operators, 5*s.* to 120, 3*s.* to five, 2*s.* 6*d.* to 35, and 1*s.* 3*d.* to five. £2 9*s.* was also given as Christmas boxes among the kitchen staff.

London Wall.—£16 4*s.* distributed at Christmas as under: One hundred and forty-eight operators having received meals throughout the year, 2*s.* Fourteen operators having received meals for six months, 1*s.* 6*d.* Seven operators having received meals for three month 1*s.*

Holborn.—£17 18*s.* distributed at Christmas as under: Seventy operators having received meals throughout the year, 4*s.* Twenty-nine operators having received meals for six months, 2*s.* £1 distributed as Christmas boxes among the kitchen staff.

The National Telephone Journal.

"BY THE STAFF FOR THE STAFF."

Published Monthly at

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ENTHUSIASM.

THE interesting little article by Mr. W. F. TAYLOR strikes a note which we hope will vibrate up and down the country. Mr. TAYLOR was the latest National visitor to America. New York and Philadelphia are the last places on earth which one who knows them would choose for a summer holiday, but like a true telephone enthusiast Mr. TAYLOR spent his short vacation on a flying visit to those great telephone centres in order to study on the spot American contract department methods. He found that the keynote of American success in the development of the telephone is the white-hot enthusiasm of all concerned in the telephone business—the enthusiasm born of the conviction that the telephone service is *the* most indispensable equipment of the modern household or business establishment. That, while we do not lack enthusiasm here, it is neither so white-hot nor so universal as in American telephone circles, we think is indisputable. In National circles there are many enthusiasts whose sole thought is telephony, as is shown by our pages every month, and every crisis that occurs in the service—for example, the fire at Paisley—shows that there is plenty of latent enthusiasm ready to respond to the most exacting calls and to cope with the most arduous situations. But on the purely business side of the service the persistent high-pressure enthusiasm that carries conviction and overcomes all objections has not yet become part of the equipment of every telephone missionary—and every telephone man should be a telephone missionary.

This grade of enthusiasm is born principally of knowledge, but the knowledge must be grafted on energy and enterprise or the practical results are small. The knowledge required is telephone knowledge, knowledge of the time-saving and money-saving qualities of the telephone service, of its high value in business and social relations and its indispensability in emergencies, knowledge of the rates, the plant, the method of working and the organisation of our great service. Thorough knowledge of the capabilities of the telephone service and of the means by which it is produced, with the natural energy and enterprise of a man who wants to get on and make his way in the world, will naturally beget enthusiasm. Without at all wishing to preach a Christmas sermon we cannot help pointing out that the average American telephone business man has greater enthusiasm than many of his English cousins because he knows his business better. The average young American wants to get on and *means* to get on. The average young Englishman doubtless wants to get on, theoretically, but too often he does not *mean* to—not with sufficient earnestness to study his business thoroughly. It is sad to observe that very many young Englishmen with their whole future before them are quite content to "tread water," doing just enough to keep themselves just afloat, but making no effort to breast the stream of life and swim up to higher latitudes.

Mr. HARE makes the same point in his thoughtful article on "The Broader Value of the Clerk." There is in far too many young Englishmen starting on a business career a lack of the ambition which is the distinguishing characteristic of the great majority of young Americans. The impelling quality of ambition makes the young American learn all he can of the business he is engaged in, and of everything else likely to be of use in that business. In that way, if the business is congenial, he rapidly becomes an enthusiast, and his enthusiasm carries him along to higher things. No man with a spark of ambition or a glimmer of imagination can thoroughly consider the wonderful feats of the telephone service and the marvellous ingenuity of the complex telephone plant without becoming an enthusiast always provided that he has the energy and enterprise which are the wick and oil without which the flame of enthusiasm cannot burn. Enthusiasm is a valuable asset. It will earn cent. per cent. interest. To acquire the knowledge of which it is born means a little extra work perhaps, a little thought and study in spare time that might be given to billiards or football. But billiards and football pay no dividends, and ten years of billiards advance a man not one jot or tittle in his life work, whereas ten years of one daily hour of study of a man's business may be worth extra hundreds a year for the rest of his existence.

Mr. TAYLOR mentions that many of the staff think that they hear too much about American telephone methods and progress. It is unfortunate that they should think so, because as regards the development in the use of the telephone service the American cities are far in advance of ours. This superior development is partly due to the much more favourable general conditions under which American telephone companies work; the absence of political and municipal interference and obstruction has enabled capital to be spent in America for telephone construction on a scale that could not be contemplated under the harassing restrictions which have handicapped the telephone business in Great Britain. But it is also partly due to the enthusiasm of American telephone workers, especially those at the business end of the concern, whose mission it is to educate all sections of the public in the value of such telephone service. It was rather in the figurative than in the literal sense that we referred to the atmosphere of these isles being less favourable to telephone development than that of the United States. The ground here is, to a certain extent, more difficult to cultivate, because the average Englishman has more pure conservatism, a more stolid attachment

to old-fashioned ways and methods, than the average American. The new power companies experience the same difficulty, and often meet with a blank refusal to substitute electric driving for an antiquated steam engine, although a clear saving in annual expenses can be proved. But just for the very reason that our difficulties are greater, the field we have to work on more unfertile and the prejudices to be overcome more deeply rooted, do we need more enthusiasm. It would be too bad if we had to confess for long that we had less.

OUR NEW YEAR'S NUMBER.

IT will be observed that this number of the JOURNAL is increased to 28 pages. This increase is partly to signalise the fact that it is the New Year's number, and partly owing to the space occupied by the interesting articles on FARADAY and the unveiling of the Faraday Memorial. We take the occasion in wishing our readers a happy and successful New Year.

MICHAEL FARADAY MEMORIAL.

THE following may be obtained from Mr. F. Gill:—Mounted photograph of those present at the unveiling ceremony, 2s. 6d.; mounted photograph of the memorial plate, 1s. 0d.

AN EARLY TELEPHONE SOCIETY.

As telephone societies are much to the fore just now, no little interest attaches to the programme of what was the first National Telephone Society, organised in Birmingham in 1889. This souvenir has been sent to the JOURNAL by Mr. Alfred Coleman, Superintendent of the Midland Province. Exactly how the society of seventeen years ago came to an end is not known, though presumably it died through the transfer of members of the staff on whom the labour of organisation fell. Fortunately, a new telephone society has been started in Birmingham, which promises to do good work. It will be noted that some of the subjects discussed at the session of 1889-90 sound quite up-to-date to-day. Unluckily, no record of the papers has been kept; otherwise it would be highly interesting to learn the views on "The Future of Telephony" and on "Automatic Switchboards" expressed seventeen years ago.

THE NATIONAL TELEPHONE ELECTRICAL SOCIETY (BIRMINGHAM BRANCH).

President: Mr. Alfred Coleman, M.I.E.E. *Vice-President:* Mr. Arthur Edgar Cotterell. *Committee:* Mr. Wm. Ollerenshaw (Chairman), Mr. P. Loftus, Mr. F. Morley, Mr. W. A. Baxter, Mr. S. S. Firth. *Secretary:* Mr. Wm. Johnston. *Treasurer:* Mr. L. H. Lowe.

The society is formed for the study of electrical matters (telephony in particular).

The meetings are held fortnightly, on Friday evening, at 40, Bennett's Hill, and commence at eight o'clock.

Programme for Session, 1889-90.

Nov. 8.—Presidential Address: "The Future of Telephony."
Nov. 22.—Paper by the Vice-President: "Disturbances on Telephone Circuits."
Dec. 6.—Paper by Mr. W. Ollerenshaw: "Induction Coils."
Dec. 20.—Paper by Mr. P. Loftus: "Construction and Maintenance of Telephone Lines."
Jan. 3. Paper by Mr. F. Brown (of the Walsall Electrical Company.)
Jan. 17.—Paper by Mr. S. S. Firth: "Automatic Switchboards."
Jan. 31.—Short Papers by Messrs. Marsh and Burgess, and Experiments with Electrical Instruments by the members.
Feb. 14.—Papers by Messrs. Foston and Fenton, and discussion on Elementary Subjects for the benefit of junior members.
Feb. 28.—Paper by Mr. L. H. Lowe: "Telephone Transmitters."
March 14. Paper by Mr. A. H. Church: "Telephony Abroad."
March 28.—Paper by Mr. W. A. Baxter: "Inspection of Instruments."
April 11.—Paper by Mr. P. F. Currall: "Batteries."
April 25.—Paper by Mr. Wm. Johnston: "Galvanometers."
May 2. *Conversazione.*

The papers will be followed by a discussion relevant to the subject in hand, to be concluded at 10 p.m.

MICHAEL FARADAY.

BY J. POOLE.

MICHAEL FARADAY, the son of a blacksmith, was born at Newington Butts on Sept. 22, 1791. At the age of thirteen he was apprenticed to a bookseller and bookbinder in Blandford Street, London, W., at which business he spent nine years of his life. He records that whilst an apprentice he, for amusement, learnt a little chemistry and other parts of philosophy, and so became enamoured of science. He managed to obtain permission to attend the lectures of Sir HUMPHREY DAVY at the Royal Institution, and his great interest in them was shown by the voluminous notes which he made. Through these notes, which he elaborated and submitted to DAVY, he was enabled to obtain a position as laboratory assistant in the Royal Institution. By great intelligence, assiduity, and cleverness in experiment he eventually succeeded to Sir HUMPHREY DAVY'S position, and for over 40 years continued to work in the institution.

His first original work was in connection with chemistry, the liquefaction of several different gases, such as chlorine, being the result, this showing that gases are but vapours of liquids having very low boiling points. He also discovered benzol and several new hydro-carbon compounds, which have proved of great commercial importance, and several new and useful alloys of steel. He also produced the so-called "optical" glass of high refrangibility, which in his hands was fruitful of other discoveries.

His first electrical work was concerned with the rotatory effects of wires conveying electric currents round magnets and *vice versa*, the first evidence of electric "torque" which in recent years has been developed so greatly in electric motors.

In the same year (1831) he made the very important discovery of current induction, showing that when electric currents were started and stopped in a straight or coiled wire momentary currents were developed in another closed straight or coiled wire in proximity. Very shortly after he made the even more important discovery that the movement of a magnet in the neighbourhood of a closed coil of wire or of a coil of wire near a magnet resulted in the generation of momentary electric currents in the coil. This was the first evidence of the production of electricity from magnetism, which in later years was to be so fruitful of immensely important results in the world's history, and to which we owe the great advance in electric lighting, traction, electro-plating, and, not least, in the working of our own business of telephony.

The laws of these "induction" effects were clearly defined and so exactly stated by him in connection with his favourite conception of the magnetic field and of magnetic lines of force that they remain unaltered to the present time.

Following on induced currents he discovered the so-called "eddy currents" produced in conducting bodies when rotated in the vicinity of strong magnets, and was then enabled to explain several puzzling phenomena which had been observed. By revolving a copper disc between the poles of a magnet he was able to collect a continuous current from the axis and periphery, this constituting the first pure "dynamo" machine.

From deduction and experiment he was able to generate currents in a coil revolved in the earth's magnetic field alone. He also explained the effects of self-induction and the resulting "extra current."

By a number of beautiful experiments he proved the identity of the different kinds of electricity, showing that static and current (or dynamic) electricity were different manifestations of the same force. He also showed that in regard to static electricity one kind, say positive, could not be developed without the development of an equal amount of the opposite kind, negative.

Other researches resulted in the discovery and the measurement of the different inductive capacities of various insulating substances, showing that the inductive action varied in strength according to the insulating substance, or "di-electric," which intervened between the induced and inducing bodies.

These discoveries have, of course, proved of much value in connection with cables. FARADAY showed how submarine cables acted as long Leyden jars or condensers, and predicted the

retardation effects which have since been experienced in long cables.

He next turned his attention to electrolysis, and by numerous clever experiments was enabled to develop and state the exact laws of the effects of electric currents in causing the splitting up or combinations of various chemical substances or "electrolytes" when acted on by the electric current. This is known as the "electro-chemical equivalent" law, which states that a definite amount of electricity is always concerned in the combination or dissolution of definite quantities of any one of the various chemical elements or compounds. This law supplemented the chemical equivalent law of DALTON, and has proved of very great value.

FARADAY for a long period held the opinion that light and electricity would prove to have a very close relation, but in spite of great labours he was only able to prove this in 1845, when he showed that a beam of polarised light could have its plane of polarisation rotated a certain degree when it was passed through a piece of his "optical" or "heavy" glass which was subjected to the action of a strong magnetic field. FARADAY afterwards speculated on the similarity or identity of light and electricity, giving reasons for believing that light and electricity in motion were different forms of the same wave force. This was known as the electro-magnetic wave theory of light, which by the later mathematical and experimental researches of MAXWELL, KELVIN, HERTZ and others has been proved to be correct in every particular.

Resulting from the above experiments on light FARADAY discovered that a large number of substances were apparently repelled by a strong magnet, and further experiments proved that all substances are either repelled from (diamagnetic) or attracted to (paramagnetic) the poles of a powerful magnet.

The foregoing constitute the main discoveries of FARADAY, but there were a large number of other researches which have rendered valuable service to the world's progress. Among others may be mentioned chemical actions of naphthaline, decomposition of hydro-carbons by expansion, explanation of CHALDUI'S sound figures, glacier movements, the electrical properties of the gymnotus, lighthouse illumination, the invention of the "Zoetrope" or "wheel of life," an instance of the persistence of vision from which has sprung the present day kinetograph.

FARADAY published the records of his electrical experiments and discoveries in two volumes entitled *Experimental Researches in Electricity and Magnetism*, which, from the value of the discoveries and the simplicity and clearness of language employed, have become probably the most important "classic" of science. It is unfortunate that this work is now very scarce and expensive, and a great boon would be conferred on science in general and on the electrical fraternity in particular by the publication of a cheap re-issue of these researches.

Unlike many an unfortunate genius FARADAY was highly honoured during his lifetime, and received honorary degrees from nearly all the learned societies in the world. His character was a model to all men in the amiable and upright qualities of his mind and actions, and he was greatly and sincerely mourned when he died at Hampton Court on Aug. 25, 1867.

The present day idea of the value of his work, even in foreign countries, may be gauged from the result of a census of the views of the principal members of the electrical profession in the United States, taken in 1900; FARADAY received nearly double the number of votes given to the next name on the list as the greatest electrical discoverer of the nineteenth century.

For more detailed particulars of FARADAY'S life and discoveries the reader is recommended to Dr. SYLVANUS P. THOMPSON'S delightful book, *Michael Faraday: His Life and Work.*

> Was ever man so simple and so sage,
> So crowned, and yet so careless of a prize?
> Great Faraday, who made the world so wise
> And loved the labour better than the wage.
>
> *Cosmo Monkhouse.*

A FARMER'S FAULT.

A FARM subscriber near Hammonton, N.J., reported to our local office that he could not get the operator to answer. A trouble man hired a carriage and drove to the house, only to find a 2-lb. general directory hanging upon the hook of the wall set.—*Telephone News*, Philadelphia.

REVIEW.

"THE *Electrician* Primers: A Series of Helpful Primers on Electrical Subjects for the use of Students, Pupils, Artisans and General Readers." Edited by W. R. COOPER, M.A. Published by the *Electrician* Printing & Publishing Company, Salisbury Court, London, E.C.—Three volumes in one, containing over 1,000 pages and many illustrations and diagrams.

The famous *Electrician* Primers, which were started as far back as 1891, have been greatly extended in scope as electrical engineering has progressed, and have now been gathered into a single portly volume which is a veritable mine of clear and practical information on almost every branch of electrical engineering effort, from submarine cable laying to electric ignition for internal combustion engines. In addition to the Primers there is an excellent glossary of electro-technical words, terms and phrases, printed on tinted paper for ease of reference.

There are three separate sets of Primers included in this electrical *multum in parvo*. The first, dealing with theory, contains 24 articles dealing with the laws of electricity, the underlying principles of direct and alternating currents, magnetism, static electricity and kindred fundamental subjects. The second set has 31 articles on electric traction, lighting and power, and covers dynamos, transformers, switch gear, distribution, various systems of electric traction, various special branches of the electric lighting art, and engines, boilers and power-generating equipment in general. The third set, of 25 Primers, deals with telegraphy, telephony, electro-deposition and miscellaneous applications of electricity.

In the main the articles are clear and straightforward, and are written by men who are authorities in their respective subjects. The section on telephony suffers a little perhaps from not being written by a practical telephone man, but the great usefulness of this volume to the telephone worker lies in the vast amount of information it contains on other branches of electrical engineering. Modern telephone plant requires a knowledge of almost every department of applied electricity, as the telephone exchange of to-day is a power and lighting station as well as a switching and talking system, while to protect his lines and apparatus efficiently the telephone engineer needs to know what other electrical workers are doing and how they do it. To every telephone worker desirous of increasing his knowledge of the broad field of electrical engineering, we cordially recommend the *Electrician* Primers. We have not gone through the book with a critical eye for errors or disputable statements as some reviewers like to do.

The illustrations and diagrams, of which there are very many, deserve a word. They are, with few exceptions, admirably executed and very clearly reproduced. The book is well bound, and stays open in the most tractable manner.

THE NEW COMMON BATTERY EXCHANGE AT BRIXTON, LONDON.

BY G, F. GREENHAM.

A NEW common battery exchange was successfully opened on Oct. 13, when the simultaneous transfer of 772 subscribers' lines, and 158 junctions from the old magneto exchange at Brixton took place. A novel feature of the transfer was the method adopted for cutting over the subscribers' lines from the old to the new board. As is usual in such cases the lines were teed on to the new main frame and the heat coils on the vertical side were left out until the day of the opening.

In the cases of Hop and East Exchange transfers the cut-off relay springs were separated by small microscope cover glasses on the day prior to the transfer, and the heat coils were then inserted in the arrester strips on the main frame, and the glasses which separated the two switchboard connections were removed at the transfer by the operators plugging into each line, so working the cut-off relays and allowing the glasses to fall away.

Although this was an improvement in previous methods, it had certain disadvantages. It was found that all the glasses did not fall away; in some cases they got snapped between the springs, and

powdered glass insulated the contacts; the result was that a good many "no glows" were found after the transfer.

One more disadvantage of this method was that the relay covers had to be taken off at a time when probably the apparatus room was receiving its final clean up, and so there was danger of dust getting into the relays.

The process of inserting the glasses is somewhat laborious, and the handling of the covers is likely to interfere with the adjustment of the relays. With a view to overcoming these troubles, Mr. BLIGHT, the electrician of the eastern district, suggested a method of transfer which the Engineer-in-Chief after due consideration agreed should be tested at Brixton. Mr. BLIGHT's suggestion was as follows:—

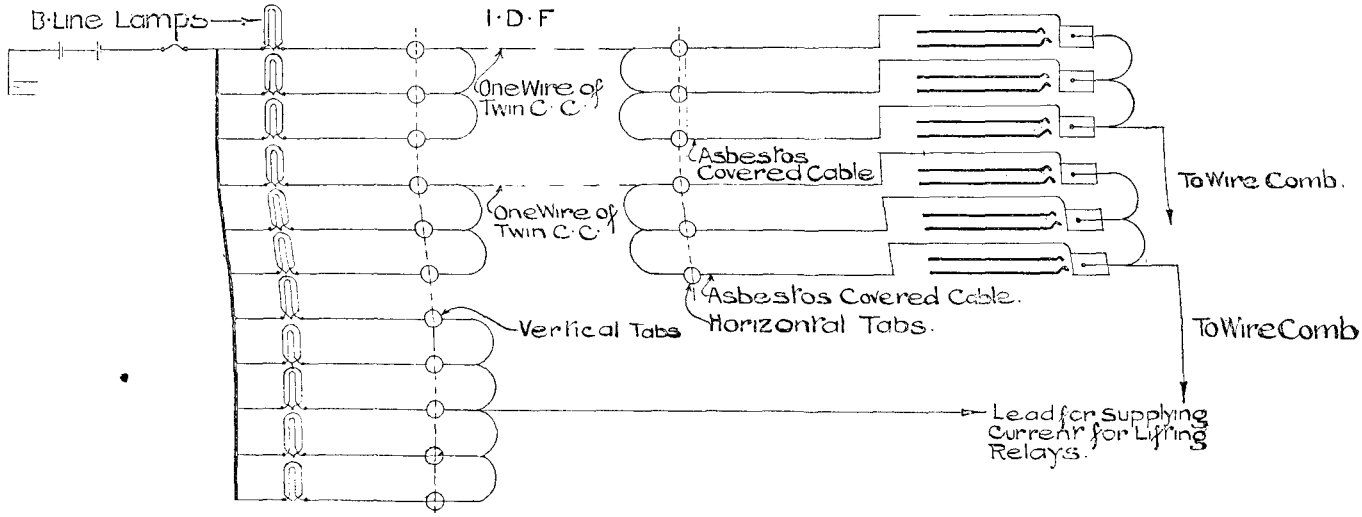
and for retaining ·05 ampere. The diagram shows the arrangement suggested and also the shape to which the bronze grouping wire is bent. This particular shape was decided on after considerable experimenting, as it is found that it secures the best contact with the bush of the jack, and prevents the wire going too far into the jacks and getting into contact with the line springs.

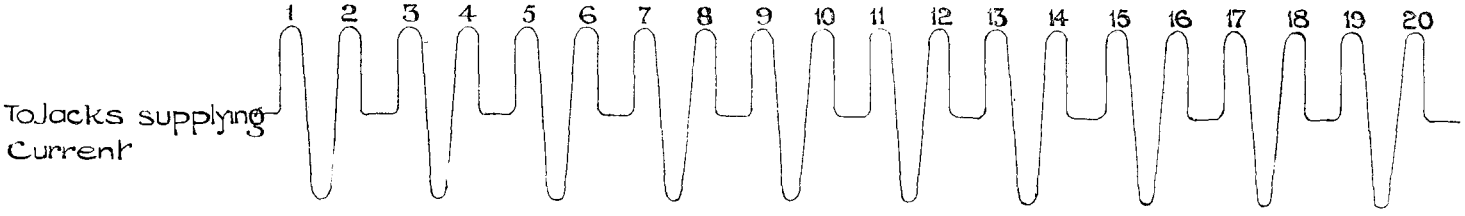
The actual wire combs are formed by twisting the wire round pins fixed at suitable intervals in a board.

At the moment of transfer the wire combs would be withdrawn from the jacks in groups, by means of tapes threaded through the longer loops.

Slight modifications were made in this method, to suit local conditions at Brixton, the actual arrangements being as follows:—

METHOD OF TRANSFERRING SUBS LINES ON TO A C·B·EXCHANGE





Wire Comb for Supplying Current to Cut off Relays via Bushes of Jacks.

On the last multiple of the switchboard the bushes of every strip of twenty working jacks should be connected together by means of specially twisted bronze wire, and each such strip of wire should be connected by means of a short length of covered wire to a piece of bronze wire making contact with the bushes of the jacks of three spare lines. The bushes of these latter three should be connected together on the horizontal side of the I.D.F., and cross-connected to three spare "B" lines on the vertical side. The current that would thus flow to the cut-off relays via the "B" line lamps would be sufficient to hold the relays up when once actuated, but would not be sufficient to actuate them. To lift the relays a lead connected to the battery through a convenient resistance, say, five "B" line lamps in parallel, should be momentarily connected to the groups of three spare "B" line tabs that are being made use of. The current required for lifting these relays would be about ·105 ampere,

Two banks of "B" line lamps and a 52-pair arrester strip were mounted on a temporary stand. Each wire comb controlling a strip of twenty lines was cross-connected by means of a flame-proof covered wire to three "B" line lamps in parallel, the other side of the lamps being connected through a fuse to the main current supply. The arrester strip served the purpose of a fuse distribution board, the heat coils being replaced by one ampere fuses. The current supply cable was connected direct with the main fuse board in the power room. As this method takes rather a large current from the cells, it is necessary to arrange for all the heat coils to be replaced on the day of the transfer, so that the current supplied for holding the cut-off relays up is not on for a very long period.

The method was entirely successful in the case of Brixton, and proved to be a very quick and clean way of changing over On

the signal being received to transfer the subscribers, the wire combs were withdraw from the multiple and the whole arrangement was cleared right away, the actual process only taking one minute. There were no subsequent troubles from "no glows," such as were experienced at previous transfers with the older method.

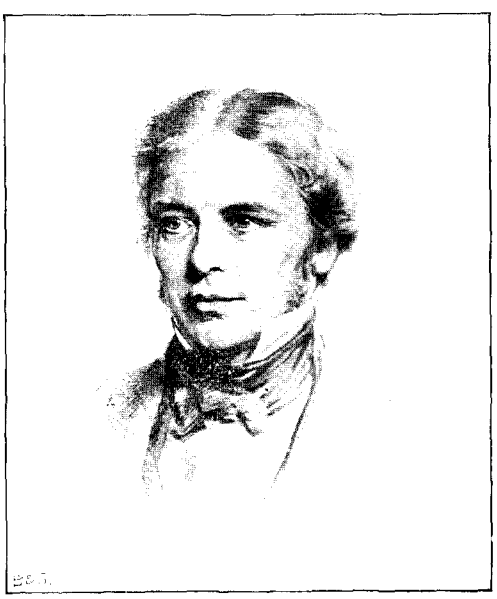
It is evident, however, that the method must be modified in detail to be employed successfully on a larger scale; one difficulty in the case of Brixton was the radiant heat given off by the "B" line lamps, which were all incandescent for several hours before the transfer and a good many of the lamps were damaged.

MICHAEL FARADAY MEMORIAL.

ON Saturday, Nov. 24, there assembled in the switchroom of the North Exchange, London, those who were able to see the unveiling of the Faraday Memorial by Lord Kelvin, Sir ALBERT K. ROLLIT, LL.D., presiding on behalf of the Directors of the National Telephone Company.

At 3 p.m. a move was made to that part of the room which is immediately in front of the chief operator's desk.

Mr. C. B. CLAY, in inviting Lord Kelvin to unveil the memorial tablet, remarked that as this was placed in the switchroom the work could not be interrupted. It was desirable, therefore, that the proceedings in that room should be of short duration, and he would be glad if, after inspecting the tablet, the visitors would gather in another room where the further proceedings would be conducted.



MICHAEL FARADAY, D.C.L., LL.D., F.R.S.

From the drawing by George Richmond, R.A. Reproduced by kind permission of the Royal Institution.

Lord KELVIN then unveiled the tablet by pressing a button, the curtain being pulled aside by electrical means.

After the memorial tablet and the plate in the floor had been inspected a photograph, which is reproduced herewith, was taken, and then the party adjourned to the operators' dining-room, where Sir ALBERT ROLLIT said: As a Director of the National Telephone Company, I invite you to partake of our hospitality, and I say a word of welcome to you here at our Northern Exchange, and especially to our most distinguished guest, my friend Lord Kelvin, and the relatives of Michael Faraday, some of whom bear his honoured name. But in thus greeting you on behalf of the Company, I wish it to be understood that the memorial tablet which has just been so gracefully and appropriately unveiled by Lord Kelvin, and the slab in the floor of the telephone exchange, are entirely due to the reverential thought and scientific spirit of the staff, originated and led by our able Engineer-in-Chief, Mr. Gill, Mr. Clay, Mr. Goddard, and other members of it. But, while not entitled to claim any part in the conception or fulfilment of the proposal, the directors most cordially approve the idea and the way in which it has been carried out. This I am authorised to say on behalf of the Company's directors, the President, Mr. Franklin, the Vice-President, Mr. Sands, my colleagues on the Board of the Company, and the General Manager, Mr. Gaine. To Lord Kelvin all of us are specially indebted. His presence and action give a character to the ceremony and prestige to the proceedings. He, of all living to-day, is the most marked out for such an occasion, to which, as to ourselves, he does honour and gives distinction. The greatest living physicist, a master of both pure and applied science, a pioneer in the practical arts and in the industrial interests of our country, and one long associated with the Company as its Technical Electrical Adviser, he helps us to honour Faraday—his friend! His lordship thus leads this service of reverence and praise and true thanksgiving, in this one-time church or chapel in which Faraday himself worshipped and preached—on a spot which to scientists is almost holy ground, once trodden by hallowed feet, leaving footprints which reverently point to the honour of God and the service and welfare of mankind. (Cheers.) May others follow in such footsteps! Perhaps, as I hope, many students may read your record, may be made emulous of the name and fame of Faraday, and be fired by his genius! And what a return does even one such industrial genius make to the world which bore and bred and trained him, educated him to his own individual happiness, and also for the welfare of the world! And yet we sometimes count too closely the cost of that public education which expands the area of such possibilities of producing a real thought-reader of Nature—like Watt, or Bessemer, or Faraday, or Kelvin—whom the world calls "a genius." All our thanks, then, I move to Lord Kelvin for his presence and performance of such a duty; acknowledging, as I do, for many of us, not only the honour and service of to-day, but the life-long benefit to those of us who have sat at the feet of such a great modern philosopher, the ornament of his age in both pure and applied science, one who taught us, by his automatic recorder, how to pierce the depths of the seas by human words, how to sound the seas for the safety of human life, and, deeper still, to attain

"The heights of thought, the depths of awe,
To reach the law within the law."

Mr. GILL seconded the vote of thanks to Lord Kelvin moved by Sir Albert Rollit, saying he esteemed it a very great privilege indeed to second the vote of thanks to Lord Kelvin for the service he had rendered them that day, and he would take the opportunity of saying a few words as to the history of the memorial. The Company purchased the building from the trustees in 1899, and, in due course, it became an exchange pertaining to the Company's system. The reference, in Dr. Thompson's *Life of Faraday*, to a chapel which the latter attended in Barnsbury led one of them (Mr. Cohen) to enquire whether there might not be some connection between the Sandemanian Meeting House and the chapel which the Company had purchased. Fortunately, the evidence to make this fact quite clear and certain was obtainable at once from Mr. A. F. Blaikley, one of the trustees, from whom the Company purchased the building. Mr. Blaikley had personal knowledge of the fact that Faraday regularly attended here from the date when the building was erected in 1862 almost to the time of his death. Mr. Blaikley took pains to make this quite clear, and obtained corroboration from Miss Barnard, a niece of Faraday, thus making the evidence quite unassailable. It was Mr. Blaikley also who supplied the information as to Faraday's seat when on the platform and as to his pew in the body of the hall. At that time the entrance was at the opposite end to where it now is, and where the present entrance is was the platform, the floor being then at a lower level.

In March last he mentioned the subject to Lord Kelvin asking him to unveil the memorial, and nothing could have been kinder or readier than his promise to do this. In a little time there was the chance that the building might pass to the Government, and there might then be some discussion as to the depreciation which should be allowed upon it, or upon some of its contents, but he was quite sure that the engineers of the Post Office and the Company would not differ regarding the high degree of appreciation applicable to the tablet associating as it did in such an interesting manner the names of Faraday and Kelvin. They, in the Telephone Company, were deeply interested in that memorial, they rejoiced at the fortune which had brought the personality of Faraday into an operating room, and they rejoined that this memorial was enhanced by kindness of Lord Kelvin whose name, a name able to stand alongside that of Faraday, had been to so many a guiding star for so long.

Sir ALBERT ROLLIT then asked Sir Joseph Swan and Dr. Silvanus P. Thompson to speak.

Sir JOSEPH SWAN said he failed indeed to find words adequately to express his feelings on that occasion. He had personal recollections of Faraday and had heard him preach. It was gratifying to them to know how closely he was identified with that building. It was a very happy thought on the part of the Company's staff to recognise his connection with the building by so pleasant a form of remembrance, and he was proud of taking even so small a part in the unveiling of the memorial.

Dr. SILVANUS P. THOMPSON had said elsewhere that it was one of the greatest regrets of his life that he had never seen Faraday, and he must express the gratification it was to him to come there and take part in the ceremony of unveiling that tablet to Faraday's memory. The religious services which were carried on in that building were intimately associated with Faraday's whole life. They would remember, and remember with gratitude, who unveiled that memorial. Lord Kelvin had the inestimable advantage of knowing Faraday intimately. On his visits to London Lord Kelvin used to look in at the Royal Institution to see Faraday, and talk over the latest things in science. Perhaps some of them would in the future say, "It was my privilege to call on Lord Kelvin, and ask him what were the latest things in science"; thus it was that science was passed on from hand to hand. That Lord Kelvin had thus lived to hand on the torch of science was something they might be truly proud of and deeply grateful for.

Lord KELVIN said: It is indeed a crowning privilege of my life to assist to-day in the inauguration of this monument to Faraday. Sixty-six years ago his was the inspiring influence of my early love for electricity. I did not then know him except in his published scientific papers. Ten years later I heard him lecture in the Royal Institution, and I had the great honour of making his personal acquaintance. For many years after 1850 my chief attraction for making a journey from Glasgow to London was always a visit to the Royal Institution to see Faraday at home in the midst of his work. Bright, lively, kind, he showed me what he was doing. He spoke to me of it, and he encouraged me to go on with any work I could take up, either in connection with electricity or any of the other interesting and important things in physical science in which he was working and making discoveries. His encouragement to me was, indeed, most valuable. I treasure it now, and I can look back upon it as an inspiring influence throughout my life. Faraday had the gift of inspiration. Clerk

Maxwell, Helmholtz, Hertz, all took their lead in electrical discovery from Faraday, and much of what has been accomplished by them has resulted from his work and influence. Take only one case—one of the numerous applications of electricity for the good of mankind wireless telegraphy. That came straight from Faraday and his American colleague in electrical discovery Joseph Henry—who simultaneously with Faraday made some of the vast advances in knowledge, which followed quickly from Oersted's primary discovery of electro-magnetism. Faraday and Joseph Henry regarded one another with mutual respect and admiration, though I do not think they actually ever met.

To-day we have inaugurated a memorial tablet to Faraday, and here in the building in which it is placed we may well repeat the celebrated Latin words *Si monumentum requiris, circumspice*, which are inscribed in St. Paul's Cathedral over the tomb of Sir Christopher Wren. Look around. In the place itself you see a monument of Faraday. These walls tell a story not of a magnificent cathedral, but of the humble Meeting House of earnest Christian men. Here were carried on the religious services of the Sandemanians in London, a very simple association devoted to faithful and earnest Christian work. Throughout his life Faraday adhered faithfully to this denomination as an officiating elder. Whatever occupied him throughout the week, every Sunday he wended his way to his chapel—not in early years to this particular building, but to one in Barbican, in the City of London. He went there regularly every Sunday, and for the last five years of his life every Sunday that he was in London he came to this place. When away from London he sought his Sandemanian brethren whenever possible. I well remember, at meetings of the British Association in Aberdeen and Glasgow, how he sought out the meetings of his denomination and spent, as a preacher or worshipper there, the Sunday and any time that he could take away from the work of the association. How very interesting it is to think of Faraday's lifelong faithfulness to his religious denomination. In another sense it is of very great interest to us to look around in this place and see the busy telephone operators doing their daily work in it. This also is a splendid monument to Faraday. Every electrician present, and all who are engaged in the telephonic business, will heartily agree with me in admiring and wondering at this beautiful and useful result of the vast discoveries in electro-magnetism in which Faraday led the way. How much Faraday would have been delighted with the telephone, some of us can imagine. It was quite unknown to him, but with what intense delight and extreme interest he would have regarded the discovery if he had lived to see it, we can imagine.

How much, too, would he have delighted in the applications of electricity to the transmission of power! Holmes had made a large, powerful magneto-

electric machine (we call it dynamo now) and brought it to Faraday. He had learned the possibility of such a machine from Faraday, who said to him: "I gave it to you as a baby, and you have brought it back to me a giant." How many other practical applications of electrical science have grown up from Faraday's work is now well known to the world.

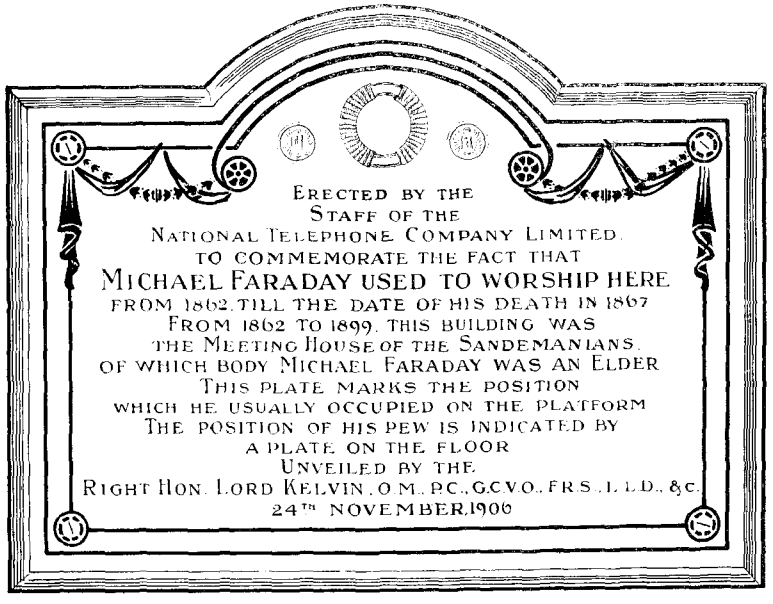
Looking upon the monument inaugurated here to-day, we feel a debt of gratitude is owing to the staff of the National Telephone Company for what they have done in religiously preserving the memory of Faraday's attendances in this place during the last five years of his life. It is of extreme interest to me to look back to the early days of the telephone before, nominally, the National Telephone Company came into existence; and to look back also on the many years which have passed since the National Telephone Company entered on its work, and began to form the grand organisation which it now maintains and controls. It has been a great pleasure and honour to me to have been officially connected with the National Telephone Company for many years, I now congratulate them on the great success which has attended their persevering activity. The

telephonic business which they have created will, in a few years be taken up and continued by the Government in the interests of the nation. Nothing could be more desirable than such a mode of immortalising the practical life and work of the National Telephone Company. It hands over its material and the good will of its staff to the Government to work for the public good throughout the British Isles.

In conclusion, Lord KELVIN said he would ever remember the kindliness of Faraday, and his fertilising influence throughout the scientific world, and the encouragements which he extended to any attempt to apply mathematical demonstration to the problems of science, which were the subjects of his daily work so long as health and life allowed him.

Sir ALBERT ROLLIT then asked those present to convey to Mr. Gill and Mr. Clay and to the staff an expression of their appreciation of the admirable arrangements which had been made.

The memorial consists of a bronze plate, fixed in the wall, and of a small octagonal bronze plate fixed on the floor. The first marks the position Faraday occupied when on the platform, and the latter, which bears the initials "M. F.," the position of his pew.



From our illustration of the large plate it will be seen that in the central top space is a ring-shaped transformer wound with two coils, and on each side of this is the field of an ordinary telephone receiver without the diaphragm, portrayed by iron filings, at right angles to the length of the magnets.

The ring-shaped transformer represents the ring with which Faraday performed one of his crucial experiments, leading up to his discovery of electro-magnetic induction. The following account is taken from Dr. S. P. Thompson's book, *Michael Faraday: His Life and Work*:—

"The summer of 1831 witnessed him for the fifth time making the attack on the problem thus persistently before him. In his laboratory note book he heads the research 'Experiments on the Production of Electricity from Magnetism,' The following excellent summary of the laboratory notes is taken from Bence Jones's "Life and Letters":—

"'I have had an iron ring made (soft iron), iron round and ⅞ths of an inch thick, and ring six inches in external diameter. Wound many coils of copper round, one half of the coil being separated by twine and calico; there were three lengths of wire, each about 24 feet long, and they could be connected as one length, or used as separate lengths. By trials with a trough each was insulated from the other. Will call this side of the ring A. On the other side, but separated by an interval, was wound wire in two pieces, together amounting to about 60 feet in length, the direction being as with the former coils. This side call B.

"'Charged a battery of ten pairs of plates four inches square. Made the coil on B side one coil, and connected its extremities by a copper wire passing to a distance, and just over a magnetic needle (three feet from wire ring), then connected the ends of one of the pieces on A side with battery: immediately a sensible effect on needle. It oscillated and settled at last in original position. On breaking connection of A side with battery, again a disturbance of the needle.'"

After that experiment he passed on through a brilliant series of experimental work over ten days, and in them laid the foundation for all modern electrical engineering.

The field of force round a magnet, illustrated by the field of a telephone, is shown on the memorial plate because, although these lines of force were known long before Faraday's time, it was Faraday who pointed out their true significance.

Faraday's paper to the Royal Society on his discovery of electro-magnetic induction was read in November, 1831, and how much he was in advance of the time may be illustrated by another extract from Dr. Thompson's work, where, referring to Faraday's "Experimental Researches," he says:

"Their effect in revolutionising electric science, if slow, was yet sure. Though the principle of the dynamo was discovered and published in 1831, nearly 40 years elapsed before electric lighting machinery became a commercial product.

"Though the dependence of inductive actions, both electro-magnetic and electro-static, upon the properties of the intervening medium was demonstrated and elaborated in these 'Researches,' electricians for many years continued to propound theories which ignored this fundamental fact. French and German writers continued to publish treatises based on the ancient doctrines of action at a distance, and of imaginary electric and magnetic fluids. Von Boltzmann, a typical German of the first rank in science, says that until there came straight from England the counter-doctrines amidst which Faraday had lived, 'we (in Germany and France) had all more or less imbibed with our mothers' milk the ideas of magnetic and electric fluids acting direct at a distance.' And, again, 'The Theory of Maxwell'—that is Faraday's theory thrown by Maxwell into mathematical shape—'is so diametrically opposed to the ideas which have become customary to us, that we must first cast behind us all our previous views of the nature and operation of electric forces before we can enter into its portals.'"

Dr. Thompson gives a vivid view of Faraday as an elder, written by Mr. C. C. Walker; the building referred to, however, is not the Barnsbury Meeting House, but the earlier one in the Barbican, the one in use before Barnsbury.

"The service commenced at eleven in the morning and lasted till about one, after which the members—'brothers and sisters,' as they called each other—had their midday meal 'in common' in the room attached to the chapel (which has been already referred to). The afternoon worship usually ended about five o'clock, after partaking of the Lord's Supper. The services were very much like those of the Congregationalists, and consisted of extempore prayers, hymns, reading the Scripture, and a sermon, usually by the presiding elder. Faraday had been an elder for a great many years, and for a considerable time was the presiding elder, and consequently preached; but during this time relinquished his office. There was one pecularity in the service; the Scriptures were not read by the presiding elder, but he called on one of the members to read; and when Faraday was there—which he always was when in London—the presiding elder named 'Brother Michael Faraday,' who then left his pew, passing along the aisle, out of the chapel, up the stairs at the back, and re-appeared behind the presiding elder's seat, who had already opened the large Bible in front of him, and pointed out the chapter to be read. It was one of the richest treats that it has been my good fortune to enjoy to hear Faraday read the Bible. The reader was quite unaware what he was to read until it was selected and when one chapter of the Old Testament was finished another would be given, probably from the New Testament. Usually three chapters were read, and sometimes four, in succession; but if it had been half a dozen there would have been no weariness, for the perfection of the reading, with its clearness of pronunciation, its judicious emphasis, the rich musical voice, and the perfect charm of the reader, with his natural reverence, made it a delight to listen. I have heard most of those who are considered our best readers in church and chapel, but have never heard a reader that I considered equal to Faraday."

The telephone industry, it is believed, is the only branch of electrical engineering which possesses such a close link with Faraday's personality, and the memorial in the North Exchange is one in which are woven the association of Faraday and Kelvin—an association which the staff in general and the North Exchange in particular will always cherish with reverence and pride.

In the picture of the group the names, reading each line from left to right, are as follows:—

1st Row.—Miss K. Barnard, Sir Joseph Swan, Sir Albert Rollit, Lady Kelvin, Lord Kelvin, Miss Barnard, H. Faraday, Dr. R. T. Glazebrook, F.R.S., President of the Institution of Electrical Engineers, Dr. S. P. Thompson, F.R.S.

2nd Row.—C. J. Phillips, Miss Swan, — Blaikley, J. Barnard, Dr. Walmsley, H. E. Harrison, S. J. Goddard, F. Gill, C. Elliott.

3rd Row.—H. Honor, J. Sandell, C. B. Clay, F. C. Raphael, G. H. Jenkins, T. Mather, F.R.S., F. Francis, H. Corner, W. Guy, A. P. Trotter, J. E. Kingsbury, A. Coleman, W. M. Mordey, E. Laidlaw, W. W. Cook, J. F. Edmonds, S. J. Smith, H. Davis.

4th Row.—T. Fletcher, H. C. Gray, W. Napier, D. Stuart, F. T. Wood, W. Judd.

5th Row.—Miss Hughes, Miss Ashmead, W. Stewart, W. M. France, A. J. Aldridge, O. Styles, R. H. Williams, J. R. Gall, H. Bines, B. S. Cohen, W. Ireland, A. Warner, J. Watkins, W. Lonnen, W. McLeod, G. F. Greenham, C. Peacock, F. Woollard, J. Poole, G. H. Briant, J. Ashton, G. Maddock, J. Wolff, H. S. Thompson, P. Prentice, P. H. Cole, H. Bruce, T. W. Woodman.

6th Row.—J. Ashton, jun., G. H. Bush, J. Teeboon, G. McGregor.

A MANDRIL AS WEIGHT FOR CHURCH CLOCK.

AN amusing incident recently occurred at Stockton whilst some underground extensions were being carried out. A short section of pipes had just been laid near the parish church, in the High Street, through which the contractor had passed a mandril to see that all was in order before laying down the flags, the mandril afterwards being detached from the draw wire and left lying alongside the trench near the church gate. Shortly afterwards it was missed, and after a protracted search and sundry enquiries from bystanders, the fact was elicited that someone had been seen carrying an article of the description given towards the church. A visit to the church proved the information correct, the mandril being found in the belfry, where it had been placed by an old gentleman, who had concluded from its shape and weight that it must be one of the weights belonging to the church clock, and that it was his duty to return it where it belonged.

THE BROADER VALUE OF THE CLERK.

By EUSTACE HARE.

THE late Mr. JAMES STAAT FORBES once said that good engineers were as plentiful as blackberries, but that a good clerk was a *rara avis in terris*; and I should say he was not a man to express an opinion immaturely, nor without some sense of the weight that would probably be attached to it.

A surface glance at this remark might lead one to read into it disparagement of the technical to the uplifting of the commercial side of great industrial undertakings, such as those amongst which Mr. FORBES passed so large a portion of his busy life; but we of the clerical department have no cause to lay this flattering unction to our souls, nor on the other hand has a single electrician or engineer reason to suspect depreciation of his science or services. On the contrary, this dictum might be simply paraphrased thus: Most engineers are good and most clerks are bad! An exaggeration, of course; but what Mr. FORBES had in his mind, I should imagine, was that he found it easier to discover the opportune engineer than the opportune clerk. I believe this to be a general and absolutely true condition of things, and it is my aim in this contribution to the JOURNAL to explain why it is so, and in some degree to point a remedy.

Perhaps it is scarcely necessary, but it may be as well for me to say at once, that in all I have written here there is merely the expression of my own personal opinions; that I lay no claim to be an authority on any subject whatever; but that any suggestions I put forward are genuine to the extent that they are coined from my own experience of what I myself have learnt, and in what I have found myself wanting.

Now, if it be really true that black swans are so difficult to find among the thousands of the craft of the quill, there must be some potent reason underlying the fact; and my own conclusion is, that if one word can sum up the situation, it will be found a "unpreparedness"—unpreparedness at every stage, from first to last—the concomitants in cause and effect lying evenly in the clerk not taking himself seriously enough and in not being taken seriously. Is it not a remarkable fact that despite modern hustle, and modern requirements, telephones, adding machines and slide rules, the same bald advertisement daily appears in the papers—Junior clerk wanted; good handwriting and arithmetic indispensable?" And the schoolboy cons it greedily, conscious of the possession of this lofty equipment for a start in life, and hugs himself in the anticipation of a wage so easily earned; what time his parents see themselves relieved of their responsibilities, and, appropriating half his salary, leave him henceforth to make his way unguided. I do not, of course, pretend that such indifference to the future is universal, but I claim this example as typical of a very large section of the clerk-producing community, from which may be expected a resultant physical and mental deterioration. If it is necessary for a boy to leave the school oven half-baked, then, I say, every penny he earns should be spent in completing his general education—the foundation of commercial success. Suppose the demand for arithmetic and penmanship were supplemented by English grammar and composition together with a certificate as to industry, memory and powers of application; what would be the economic result? Fewer candidates, better work, and fewer clerks, who would command a higher reputation, and consequently higher pay. And for the residue whose abilities do not lie in these channels, there are still ships to be worked and land to be tilled and many other occupations requiring dexterity, more or less, but little exercise of the brain.

I am quite sure that it is, first, his imperfect general education and, afterwards, his lack of judicious training that makes the way of the clerk so steep. Moreover, he is beset with this double difficulty; he does not know what he lacks, or even that he lacks anything at all, and his employer often does not know or cannot define exactly what he himself wants or expects. After all, it is far from easy to say precisely what constitutes a good clerk, and it is this very elusiveness and intangibility that baffle the beginner and lure him into a false sense of complete equipment. Widely different and comparatively simple, on the other hand, is the position of the embryo engineer; for not only does he know he must learn something before he can begin, but a defined course is mapped out for him.

As the difference between the position and training of the clerk and the engineer is of the essence of my subject, I may perhaps be pardoned for labouring the point by one or two illustrations. Most of us are acquainted with the amateur singer and the amateur pianist, and we know that of the two the former is the more presumptuous and daring, for he is prepared to exhibit his powers with very little training, and, not infrequently, with no training at all; the reason originating in an unfortunate delusion (shared by all the untutored) that the possession of a voice proclaims the singer. The amateur pianist is on a different footing altogether; for although he may have no more real musical ability than the singer, he must have had *some* training to be able to perform at all, and this being apparent, earns for him the greater measure of applause; the unmusical not recognising the merely mechanical nature of the effort. Now substitute for the amateur, the highly cultivated artist in each case. The man in the street (who is usually wrong) discovers in the singer a wonderful voice and a sympathy between the singer and the song; and nothing more. In the pianist he sees, or thinks he sees, something greater: a prodigious memory, a marvellous technique; and to him the performance is much the more wonderful of the two. The critic could tell another story; he knows that the training of the one has been just as arduous as that of the other; that each has had to gain the same general musical knowledge, to acquire the same flexibility of execution, attack, accuracy of phrasing, evenness of tone and so forth; but that the singer is at a disadvantage in having, in addition, to perfect and preserve and, to some extent, to produce the instrument with which he performs. The virtuoso of the keyboard, on the other hand, has his instrument ready-made, and it never fails him. If the clerk be substituted for the singer and the engineer for the pianist, I think the reader will take my meaning.

Another analogy may be found by comparing the author and the painter respectively with the clerk and the engineer. The uninitiated will agree that both must have ideas; but ask him which of the two has the easier task in expressing them, and he will answer unhesitatingly, "the author." In a picture he sees not only the effects of the artist's skill, but the skill itself; the marks of the brush and the blending of the pigments; not only an idea but its translation into form and colour. In the book, he reads the story and approves the sentiment, but appreciates little or nothing of the labour of composition, arrangement, the storing of facts, the clothing and consistency of characters, the local knowledge, etc. "What so easy," he says, "as to write if one can only find the ideas?" It may be protested that my analogy is faulty in that the writer has his pen, as the painter his brush. True, if every man were a connoisseur; but unfortunately it is the mediocre—alluring to the eye and easy to the understanding—that appeals to the Philistine; and to him pictorial claptrap often assumes a higher place than real merit in printer's ink.

The painter and the instrumentalist have their schools and professors, but no one can impart style to the author or sound to the singer. Up to a point, the education in each case is on fixed and defined lines; beyond that point the two latter are wholly dependent on their individualities, having no mechanical medium of colour or keyboard through which to channel their art.

While disclaiming any intention or desire to introduce comparisons of the relative importance of the technical and commercial worlds, my object in the foregoing illustrations is to show that the clerk, being in the same position as the author or singer, has not the ready means of acquiring the higher qualifications of his calling nor of manifesting his worth as exist in the case of the engineer typified by the painter and pianist. Let it be understood that I am not attempting to deal with giants, such as, say, inventors—who are often confused with engineers—financiers or leaders of great industries who have risen from the engineering and clerical ranks; but with the average man seeking knowledge and advancement. At the starting point the engineer and the clerk toe the line together and, assuming equal intellects, have, or should have, level chances; but usually, the clerk no sooner crosses the line than he begins to fall behind, and not altogether through any fault of his own.

The reason for this, in my opinion, is obvious. The young engineer or electrician enters into an absolutely new atmosphere

and is at once confronted with his own ignorance, which forces upon him the prospect of much to be achieved before he can hope even to begin to "arrive"; new facts and formulæ to be learned and new tools to be used; nothing to be done without reasoning and calculation, nothing to be left to chance. There is, of course, much drudgery, but there is also the satisfaction of seeing tangible results at each stage, providing interest and incentive for continued effort. Thus he begins, perforce, to exercise his brain from the very first day of his novitiate, and although he may never attain to distinction, and possibly progresses without enthusiasm—perhaps merely from sheer necessity—he gradually, *nolens volens*, becomes more or less skilful in his work, which, laying outside common knowledge, makes him useful and marks him as a specialist. But I believe I am right in saying that throughout the initial training there is no uncertainty of course or subject; scientifically or mathematically every result can be proved accurate or otherwise.

Now take the case of the junior clerk. The horizon of the office, so far as he is concerned, is bounded by familiar surroundings, viz., books and figures; the difference between office and school being that the discipline of the former is less severe and he is paid for what he does. It is all so easy, a mere matter of practice and routine, the thinking department to be left to the heads —who it must be confessed are apt to consider it their exclusive prerogative, to be jealously guarded— until such time as the exercise of the reasoning faculty becomes necessary, when it will spontaneously and miraculously be found ready to hand! In the meantime, excepting as a machine, the clerk rusts; habits of study (at the most receptive age) fall into disuse and years may elapse before he discovers how much ground he has lost, and how unprepared and unfit he is for any promotion demanding responsibility and judgment. It is not that he is without ambition or, necessarily, without intelligence, but that he positively does not know until he finds out for himself, often when it is too late, what cultivation is necessary and how to get it. I am not, of course, implying that the intervening years have been altogether frittered outside the office walls, for the average mind generally seeks some outlet for expansion; and is not the great army of amateurs and hobbyists largely recruited from the clerical ranks; writers of books and plays (successful ones too), philatelists, fiddlers and horticulturists? I myself number among my friends a clerk who has found leisure to prepare himself for and obtain a Bachelor and Doctor's Degree of Music; and what engineer could find time to do that? The clerk, as a rule, is entirely rudderless as to shaping a course after he has mastered the mere use of his tools; that is to say, after he has made himself acquainted with ordinary arithmetic, double entry and perhaps shorthand, vaguely imagining the rest will come naturally as occasion demands; inexperience concealing the difficulty of mating fresh beginnings with maturity, and the fact that the man has to be found prepared to fit the opportunity.

To come to the point, the great stumbling block that lies in the path of the clerk is that not only has he to acquire knowledge, but to cultivate virtues, and it is in the possession of these virtues that his strength chiefly lies. For whereas the engineer has to deal with solid facts, the clerk has in his higher walks to deal with men. In both cases so far as the groundwork is concerned there is, I suppose, only one opinion, namely, the necessity for a sound, general elementary education. But in the case of the clerk this requires development and, in addition, he must cultivate a good memory, method, resource, a readiness to grasp facts and details, sequence in reasoning, tact, initiative and self-confidence. Many of these qualities, I agree, are the necessary appurtenances of an engineer, but they are the very assets and being of the clerk, and accordingly must be prized and increased in the same way as the capital of the financier or the stock of the farmer. To some, the list of qualifications I have quoted may be formidable; others may congratulate themselves on a natural and happy endowment of the whole, and exclaim, "much ado about nothing," and to these I apologise for having brought them so far on a wild-goose chase.

To the less fortunate, especially those of junior rank, I should like to suggest briefly my own idea of what, generally, a clerk's training should be. At the early age at which frequently a boy leaves school to enter an office, his general education is necessarily incomplete, and therefore it is essential he should resume his broken studies; easy enough in these days of evening classes, and I am sure that, usually, his day's work is not so arduous as to leave him insufficient energy for this purpose.

With regard to subjects, the competent clerk has to be so cosmopolitan in his knowledge that it is somewhat difficult to advise, but I will endeavour to sketch a fairly comprehensive list. As general education, one may include English (grammar and composition), history and geography, Latin and French—the two last chiefly to assist in the foundation of the English arithemetic, algebra, and a course of geometry. Then as to special subjects by which the actual technique of office work may be acquired, there may be cited bookkeeping, company law and banking, logic and economics; and in addition to these I strongly urge the study of languages. I suppose there is no want of knowledge so generally regretted by the average Englishman as that of foreign languages, nor such keen regret of neglected opportunities recognised as when, too late, he finds he has shut himself out from first-hand acquaintance of the literature of every nation but his own, and that the charm of visiting other countries is stunted and narrowed by the impossibility of free and natural speech with their peoples. And putting aside the sentimental aspect, there is no doubt that to the clerk there is a high intrinsic value in the knowledge of languages. One of the head officials of our Company lately told me that a short time ago he asked a friend, a banker in London what he intended to do with his son, and the reply was: "I shall make a clerk of him." The question was then put as to how he would proceed, and he said: "I shall first send him to a public school; then he will spend a year in Berlin to learn the language and acquire a knowledge of the business ways of the German; then the process will be repeated at Madrid, and then at Paris, and, finally, he will complete his commercial education in my own bank." The privileges and advantages of such a thorough training are, of course, conceded only to the few, but there are many junior clerks at this moment in the Company's service to whom the Society of Arts, the Chambers of Commerce, and other institutions throughout the country open their doors for their particular benefit as commercial students. In the electrical department of our business one hears of numbers of the staff graduating at such institutions in their special spheres, but few and far between are the records of those of the clerical establishment who have achieved honour in commercial lore. If only the young clerk can be induced to acquire and continue habits of study, I feel sure that, in most cases at least, it will not be long before the practice will become a fascination, and in no instance more so than in that of learning new languages.

It may be asked, "What will be the immediate advantage of all this training?" I am afraid I must leave my readers to find it out for themselves, and can only promise them that sooner or later, a sound education always "tells." As I have already tried to explain, it is the *tout ensemble* that makes a good clerk; but I might further add a practical and reasonable word to the wise. Does any clerk imagine that in the event of his promotion being considered he will be any the worse off if his chief is able to say on his behalf: "In addition to being an excellent clerk, this man can correspond in French or Spanish?"

In another issue of the JOURNAL I hope to be allowed to come to closer quarters, and to apply what I have attempted to convey to our particular business; but I should like so far to anticipate that part of my subject by saying that, in my opinion, the district manager should find his work easier if he is a commercial expert first and an engineer afterwards; and I venture to think that a clerk who has trained himself on the lines I have indicated should not find insuperable difficulty in acquiring the electrical knowledge necessary for such a post.

HOW SEVEN LIVES WERE SAVED.

THE warning of a dog, according to the *Morning Leader*, and a mad dash to a telephone saved a family from death at Sunderland. Mr. Forester, caretaker of Baltic Chambers, was awakened by the furious barking of his little dog, to discover that the premises were on fire. Rousing his wife and five children, he rushed through clouds of smoke, picked up the 'phone receiver, and sent through a call to the fire station. He then helped his family and the dog to ascend to the sloping roof, from which position they were rescued by the firemen.

HIC ET UBIQUE.

THE comparative tables showing the ratio of telephone stations to population, with which we are from time to time regaled in printed official documents and elsewhere, are often based on varying conditions. Their commonest failing is to divide the population within the small area of a city boundary by the number of telephones in a given telephone area. London suffers especially in comparisons of this sort, a round six million souls perhaps being estimated for the telephone area, and this figure is divided by the actual number of telephones; whilst in the case of another big city the population within its boundaries is divided by the telephones distributed inside and outside those confines. To get a fair idea of the ratio of population to telephones in London, we may take the inner area from, say, Paddington and Kensington to Bow, and from Hackney to Brixton, the population of which is about 3,000,000. In this region there are upwards of 100,000 telephones, yielding an average of 30 inhabitants per station, which compares favourably with most of the large cities of the world. The development of telephones per inhabitant in the vale of Middlesex, on the Surrey hills or around Epping Forest is naturally not the same as in a city, and the lumping of the figures for these places with those of London is detrimental to the latter for purposes of comparison.

AN American contemporary publishes a list of articles which have appeared from time to time in its columns illustrative of the various extraneous uses to which the telephone is put. Amongst them are electioneering, sending weather forecasts, helping church work, finding lost articles, school purposes, etc. Our own columns would furnish an equally interesting table of the very varied applicability of the telephone. For instance, it is used in connection with

Burglar catching,
Fire signalling,
Football reporting,
Notifying police,
Notifying home in the small hours when motor breaks down,
Quelling street fights,
Rescue from drowning, and
Viva voce examination,

not to mention the miraculous electrocution of obnoxious statesmen in pseudo-scientific novels!

THE principle of payment in kind is apparently not yet dead in this country. A greengrocer who was very backward in his payments was pressed for his telephone rental, which had to be obtained in instalments. His expectations that the Company would write off the last 3*s*. 2*d*. were disappointed. Three shillings more were forthcoming after several calls by the collector, but the remaining 2*d*. was hard to obtain. After several tempting offers from his stock, the greengrocer cried in disgust: "Won't you take a cauliflower in settlement of the debt?"

WE are asked to believe as evidence of the spread of the telephone habit that a minister recently surprised his congregation by giving out "Hymn double-six-oh!"

A GOOD man struggling with adversity (or was it an irascible one not struggling with his temperament?) at the telephone cried: "Look here, is there a blithering idiot at the end of the wire?" In a still, small voice came the soft answer which turneth away wrath: "Not this end, sir."

NATIONAL PROVIDENT CLUB.

THE above club, for the benefit of the employees of the National Telephone Company, has just ended its tenth year, the receipts amounting to over £3,000. The sickness this year has been heavy (showing that the club's existence is necessary), but not quite so heavy as the year ending 1905, and the balance shows an increase of 3*s*. on the last year's balance sheet in the annual share-out of the balance in hand at the end of the year. We regret that there were two deaths during the year, viz., Mrs. Sleigh (wife of Mr. Sleigh, City engineer) and Mr. E. Castle, of the outside staff in Southern district, whose relatives received substantial benefits to help them financially over their losses.

The National Provident Club needs more support from the employees, and members are earnestly desired to rally round the club which commenced a new year from Dec. 1, 1906.

CORRESPONDENCE.

CHANGING MAGNETO INSTRUMENTS TO COMMON BATTERY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. A. R. Macfarlane's letter in the November issue, the primary object of my remarks on this subject was to furnish an idea of the methods adopted for actually carrying out the work of changing instruments, looking at the matter from the point of view of the Instrument Department. I am pleased, however, to be able to answer the questions raised, thanks to the kind co-operation of Mr. P. R. Cockrem, cost clerk of the Nottingham district office, and deal with the points as follows:—

1.	Number of men engaged in actual fitting (It is necessary to explain that nine fitters were not engaged *continuously* during the period of the change, but this is the total number of men employed.)	9
2.	Number of supervisors and clerical staff (One inspecter exercised supervision over the work, and also performed necessary clerical work.)	1
3.	Number of subscribers with single instruments - 644 subscribers representing stations	644
4.	Number of subscribers with one extension—94 subscribers representing stations	188
5.	Number of subscribers with switchboards — 20 subscribers representing stations	68
6.	Switchboards counted as one station each for fitting	20
	Total	920
7.	Cost per station	1*s*. 8·6*d*.
8.	Total cost per instrument changed (including, in addition to fitters' time, such items as gang's time, running power leads and unpacking cases, distribution of new and collection of old instruments, storekeeping and dispatching of old instruments to the factory, etc., etc.)	3*s*. 1·5*d*.

Nottingham, Nov. 14. M. B. OLDBURY.

THE BENEVOLENT FUND.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REFERRING to Mr. Payne's letter in the December JOURNAL, and although entirely in sympathy with the society and anxious for its funds to be augmented, I think before diverting, in the manner Mr. Payne proposes, money collected for another specific purpose, we should await the result of a year's claims upon the Benevolent Fund with a view to seeing if its excellent objects are achieved.

No one can close their eyes to the claims of the hospitals, and I think in this respect the National Telephone staff should not let charity end "at home." I certainly do not agree, however, to Mr. Payne's suggestion to select half-a-dozen hospitals among which to distribute half or the whole of the Saturday collections, for at most this would cover in or out-patients' tickets for treatment. I think he can scarcely be aware than in contributing to the Hospital Saturday Fund, the Company's staff not only gain the benefit of tickets for treatment at almost every hospital in London, but for dental institutions, operations at the hands of private dentists, and surgical appliances, but for what is sometimes almost a greater boon than mere treatment, tickets of admission to various convalescent homes, and from my experience among the operating staff I should be very sorry to see these benefits curtailed. FLORENCE J. MINTER,

58-9, London Wall, E.C., December, 1906. Examining Matron.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I HAVE always understood that it is considered unwise to throw away the substance for the shadow, and this, it appears, is what Mr. Payne in his letter appearing in your December issue seriously proposes to do. Perhaps, however, he hardly goes as far as that, as what he suggests is to discard half the substance for the benefit of the shadow, and then to materially restrict the power for good of the other half.

It is, I believe, incontestable that the Hospital Saturday Fund is doing most excellent work, and in contributing to it the staff are not only benefitting any of their own number who need the skill and care available at our hospitals, but also enabling many others who cannot afford medical advice to obtain it free of charge. In other words, they are contributing to meet a very real need which does most undoubtedly exist, and it is suggested instead of this that half the money should be devoted to meet a need, which, as far as I am aware, happily does not exist at the moment, and which we all most sincerely trust never will exist.

Regarding the other half, by contributing to the Hospital Saturday Fund, practically the whole of the hospitals of London, both general and special, are available for the staff, and instead of this it is suggested that, say, half a dozen selected hospitals should be contributed to, and as a result very many of the special institutions which benefit from the Saturday Fund would no longer be available for the members of the staff. In my experience I have found that these special institutions are those which are made most use of.

While wishing the Benevolent Fund, of which I am a member, every success, I would ask you, Mr. Editor, through the columns of our JOURNAL, to urge the Metropolitan staff to bring their contributions to the Hospital Saturday Fund up to £800 a year (and there is no reason why they should not), and the provincial staff to whole-heartedly support any similar organisations which may exist throughout the country.

Salisbury House, December, 1906. WALTER GLENNY.

AUTOMATIC BOX FAULTS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REFERRING to the interesting article, by Mr. F. J. Frost on "Automatic Boxes," in the November JOURNAL and the leader on the same subject, no one seems to have taken into account the particular time at which most of the buzzer failures occur, and perhaps the following will prove of interest.

A certain busy call office was almost daily reported "out of order," and when the inspector arrived he invariably found it "O.K." It was then noticed that the box was always reported soon after a previous effective call had been through. As an experiment two separate cells were fitted to work the buzzer independently of the ordinary speaking cells, and complaints are now practically unknown. The conclusion arrived at is that the voltage of the transmitter cells drops so much when the battery is used any time for speaking that there is often not sufficient time between calls for it to recover, consequently there is not sufficient energy to start the buzzer, although the lower voltage would hardly have any effect on the talking. The two cells have now been working for nine months, and as the current used for the buzzer is only very small and intermittent, they are likely to last for some time yet. The increase of cost is easily saved by the freedom from buzzer faults, not to mention the time of the inspector and the absence of trouble to the public using the box.

Belfast, December, 1906. A. R. PULFORD.

CORRESPONDENCE FILING.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I CORDIALLY endorse Mr. Kirk's sentiments expressed in the December JOURNAL. While professing unbounded admiration for the sterling qualities of my friend, Mr. Garner, I must confess that the impression one gets on entering his office is:

Shannons to right of 'em,
Shannons to left of 'em,
Shannons in front of 'em—
Lettered and numbered.

I have had the advantage, by Mr. Garner's courtesy, of inspecting the reading office, and while seeing many things to admire—some, in fact, which I have since copied—I think the filing system is carried somewhat to excess. My experience coincides with that of Mr. Kirk, as any intelligent clerk can keep his own correspondence batches going until completed, when they can be filed away out of sight, and yet can always be got at if occasion arises. It seems to me that this is another question which might well repay legislation. Many items of smaller import have been legislated upon by Head Office; while this has been practically left alone. At present it is largely a case of each one for himself. New district managers often make radical changes, and it certainly should be the case that one uniform system should obtain throughout the kingdom, thus avoiding individual idiosyncrasies.

Brighton, December, 1906. L. PARSONS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REPLYING to Mr. Kirk's remarks in the December JOURNAL, may I be allowed to state that the shelves and Amberg cases do not take up so much room as apparently is thought, and they add to the businesslike appearance of the district office rather than otherwise.

There is no time lost in my method of filing, as with the exception of working orders and store debit notes, the various papers are placed immediately on receipt in their permanent resting places. Whatever system is adopted the work orders and debit notes are bound to be manipulated in the same way as mine are, but with the aid of the Shannon filing clips the transfers are very quickly made.

The use of drawers as a receptacle for the clerk's various papers I have long ago condemned, my experience having taught me that the papers have remained there at times a little longer than they should have done. It is far from pleasant if any particular paper is wanted quickly to have to wait while the clerk blushingly searches through his drawer. Some drawers I have seen would do credit to a bran-tub.

My idea is to have a place for everything and for everything to be put in its proper place, and to adopt a general system so that if a clerk should be away any other can find the papers.

There should be no burial grounds.

Reading, Dec. 4, 1906. A. GARNER.

RENTAL REGISTERS AND FAULT CARDS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I MUST thank Mr. Bryson for responding so readily to my request in the October JOURNAL, but at the same time would like to point out that he is apparently entering particulars of installations in the new register, practically as he would have done in the old books, thereby proving that my contention is correct as regards the *utility* of the "particulars of apparatus" column. He is, however, somewhat contradictory in his remarks, as in the fourth paragraph of his letter he states "the particulars of apparatus column is unnecessary, while in the sixth paragraph he proceeds to state the method adopted by him to show such particulars in the register.

Mr. Greenham also, in the ninth and tenth paragraphs of his letter, concedes that diagrams similar to that outlined in my article in the August JOURNAL are necessary, and therefore agrees that if the information is not to be shown in the registers some adjunct to the fault cards is required. Mr. Bryson will, of course, recognise that it matters not in what form the entries are made in the register, so long as they appear, or that we are not compelled to rely absolutely upon the accuracy of the fault cards for this important information.

Liverpool, Nov. 20, 1906. A. C. GODFREY.

POT-HEADS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. Frost's article in the November JOURNAL, could not pot-heads be made up at the factory and tested with air pressure ready to be jointed to the cables, as shown in Correspondence Class, "C" Course, 1905-6, Fig. 31. There is no doubt that some jointers have better methods than others of preparing the ends of the leaders and making the pot-head, and if these methods were compared and the best adopted for making all pot-heads at the factory, the time at present wasted by the bad methods would be saved, and it is probable that cheaper labour could be employed at the factory.

To go a step further, it might be possible to save paying for the braiding and lapping of the leaders and afterwards paying for stripping them, by having wire supplied without the outer coverings, to be cut off into short lengths and made into sealed joints, one end to be connected to the cable and a sleeve wiped on and the other end connected to ordinary vulcanised india-rubber leaders.

S. MOODY.

CHESS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. Hare's letter in the November issue, I certainly think that we might form a chess club among the many players in the Metropolitan area.

There should be no difficulty in obtaining the necessary support to make the club a success, and a suitable room could no doubt be obtained at a moderate rent.

I will, at an early date, send a whip round Salisbury House, and let Mr. Hare know what support we are likely to get here. Perhaps in the meantime other devotees of the game will do the same in their centres.

Salisbury House, E.C., Nov. 20, 1906. R. P. LOWE.

PORTRAITS OF TELEPHONE MEN.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to the excellent series of portraits of "Telephone Men" now appearing in the NATIONAL TELEPHONE JOURNAL, I should like to suggest that in future each portrait and biography appear on a loose sheet, comprising four pages, the portrait to be on the first page and the biography on the third page—the sheet to be a little smaller than the present size of the JOURNAL, and plenty of margin to be allowed for binding. In this way it would be possible for subscribers to the JOURNAL to collect separately each portrait with biography, and at the end of the series to have them bound up in a volume, the JOURNAL issuing a suitable cover in due course.

If this suggestion is approved, I trust that the seven portraits already printed will be issued in the manner suggested, the smallest possible charge being made for same, and I venture to think that so long as sentiment counts for anything in human affairs, the result will be a unique and interesting volume, which will be greatly valued by each possessor.

Telephone House, E.C., December, 1906. PERCY CHESTER.

"FOR THE GATHERIN' O' THE CLAN."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

No doubt many local managers have experienced at times some little delay in gathering their men in cases of sudden breakdowns or serious faults to be cleared on Sundays and Bank Holidays.

I thought perhaps some of the readers of our JOURNAL would be interested to know that I have found a flagstaff very useful for this purpose. My residence is situated at the top of a hill in Dover, and I have erected in my back garden a flagstaff 36 feet high.

When occasion requires, I hoist a red burgee, four yards long and five feet at the hoist (for the benefit of non-nautical readers I may say that a burgee is a triangular flag). On it is worked in yellow a design of our time-honoured emblem, the hand micro-telephone. This flag, visible from nearly all parts of the town, can be seen by many members of the staff, particularly the faultsman and foreman, from the windows of their houses.

I recently called up my faultsman on a Sunday morning within ten minutes of hoisting the flag.

I merely suggest this as a means of *assistance* in such cases, as, of course, the men are sent for according to requirements if no results happen from the flag within fifteen or twenty minutes.

Such signals might be hoisted from exchange standards or poles, clear of the wires, perhaps in the form of the usual red ensign with the Company's H.M.T. in the field.

Dover, Nov. 1906. F. DUERTH, Local Manager.

TEAM WORK IN OFFICES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

Mr. HARE'S letter has undoubtedly been read with interest by all district office clerks. I cannot, however, agree with him in every respect. Having had several years' experience in two district offices in the southern province I am strongly of opinion that to an efficient and intelligent man no such thing as a "watertight compartment" exists. Good management is, of course, a great consideration. What happens in the Gloucester district office when a clerk is on holiday or sick leave? His duties have to be done by another man, for they cannot be allowed to drift. Time has to be found for this, and experience is obtained. Again, the resignation or transfer of a clerk provides openings, and the ambitious man who has somehow or other obtained knowledge of the departing clerk's work is promoted. Why should I be thrown out of the office if I endeavour to find out how the district manager's report is compiled? It is only by these means that one qualifies

for promotion. Each item of the office work of the Company blends more or less into each other item. Some of the Company's bookkeeping may be staggering to a new man, but with a year or two of experience the main points are surely not difficult to grasp. For instance, I cannot understand an intelligent man issuing works orders without learning something of the rental register and the 2A and 2B Returns. The cashier knows the No. 5 Return, and ought without any schooling to understand the cash book and No. 1 Return. He must also understand the O. S. Returns, rental registers and fees journals, to which he is continually referring. A clerk who can read any of the Company's books can certainly compile them. Again, take the Expenditure Returns 4, 5 and 6 with their allocations. A clerk dealing with one of these can very easily follow the others by intelligently grasping that it is the Company's expenditure that is being dealt with through three channels, by gang-sheets, receipts, and stores slips. Each of these clerks has only to look at a 149 Form to get an idea of what a cost clerk has to do. Wayleaves are touched by the rental clerk in connection with contracts, by the works orders clerk in connection with recovery of plant, and of course by the cost clerk for expenditure.

The stores clerk's scrap material brings him into contact with the 2B Return. To compile the 2A and 2B Returns a clerk must know the fees journals, M.R. books, 4, 5 and 6 Returns, cost slips, stamp duty book, and so on. If a man gets into a "watertight compartment" I think he is somewhat to blame. He cannot have much desire for promotion, nor reasonably expect it, being inefficient in every capacity except one. If a little additional electric light is used for the mutual benefit of the Company and the employee nobody grumbles; although my experience has been that *some* clerks are *always* working overtime, whilst others are away sharp at six. The latter class invariably get through as much work as the former, perhaps more. Why is this?

It would be exceedingly interesting to hear what the clerk in the larger district offices has to say on the subject.

Norwich, September, 1906. W. J. PRATT.

LIGHTING CURRENT AT POWER RATES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. Wallace's remarks in the December issue of the JOURNAL, my paper suggested that the cells would be charged from the motor generator during the daytime, thus adding to the day load and increasing the supply station's power factor. Current would be taken from the cells at night for lighting. There is nothing illegal or irregular in the arrangement, and full lighting rates could not be charged by any company or corporation. With regard to the fittings it would be an advantage, in my opinion, to clear away high voltage fittings, while the cost of transformation put at 40 per cent. (which, I think, a fair figure) would, in my opinion, be a mere bagatelle as compared with the saving effected.

Blackburn. C. REMINGTON, District Manager.

NEWS OF THE STAFF.

Mr. A. L. E. DRUMMOND, the District Manager, Newcastle-on-Tyne, completed 25 years' service with the Company at the end of November.

Mr. R. T. MCCAHEY, Chief Electrician, Swansea, has been transferred to Bristol. Prior to his departure he was presented by the staff, as a token of esteem, with a handsome oak salad bowl and silver cruet. Mr. G. Hey made the presentation.

Mr. J. RADFORD, Swindon, has been appointed Chief Electrician, Swansea.

Miss A. M. LEWIS has been appointed Observation Clerk, Swansea.

Mr. L. E. WATKINS, Apprentice, Northampton, on being promoted to Inspector at Coventry was the recipient of a present, in the form of a handsome dressing case, from the staff.

Mr. L. P. SHAKESHAFT, who has been a member of the South Midland district office staff for the last six and a half years, was, on Monday, Nov. 12, presented with a handsome travelling rug and silk scarf by his fellow members of the staff, on the occasion of his leaving the Company's service for Canada.

Mr. J. B. SALMON, Burton-on-Trent, has been transferred to Colwyn Bay as Engineering Inspector.

Mr. E. W. JOHNSON, Instrument Fitter, Hull, has obtained first place in Magnetism and Electricity, Stage 2, at the Hull Municipal Technical School examination, for which he has been rewarded with a complete set of drawing utensils.

Mr. F. VEAR, Instrument Fitter, York, has been promoted to be Inspector at Hull. On the occasion of the transfer he was presented by the York staff with a portmanteau.

Mr. JAMES LEITCH, Chief Clerk, Greenock, has resigned his position on account of the state of his health.

Miss AGNES TROTT, Brighton Traffic Department, Brighton, has been promoted from Monitor to Supervisor, and Miss J. BONHAM from Senior Operator to Monitor.

Inspector MITCHELL, Newcastle-on-Tyne, has resigned in order to take up a post with the Canada Cycle and Motor Company, Toronto. Souvenirs from the staff were presented to him and Mrs. Mitchell on their departure for Canada

Miss E. SNOOK, Operator, Portsmouth, has been transferred to the Metropolitan area.

Mr. L. CRUCE. Observation Clerk, Portsmouth, has been transferred to Manchester as Assistant Exchange Manager. Mr. Cruce, who is a Fellow of the Royal Statistical Society, was presented on leaving Portsmouth with a silver travelling clock.

Mr. A. WILSON, Chief Clerk, Portsmouth, has been transferred to Maidstone.

Mr. H. C. HAMILTON and Mr. T. H. R. ROGERS, Audit Department, Head Office, have been transferred to the Portsmouth district office.

Mr. A. BETENSON, Service Inspector, Portsmouth, has been transferred to Guildford as Wayleave Officer.

Mr. F. D. ASHWORTH, Wayleave Officer, has been transferred from Brighton to Watford.

Mr. F. E. COLLINS, Chief Clerk, West Kent district, has been promoted to be Chief Clerk, Portsmouth. Before leaving Maidstone he was the recipient of a handsome barometer, suitably engraved, subscribed for by the staff of the district.

Mr. W. HILLS, of the London Switchboard Construction staff, was presented on Dec. 14 with a case of fish knives and forks and a wedgwood biscuit box, from the members of the Metropolitan staff, on the occasion of his marriage.

London Traffic Department.—*Transfers and Promotions for December.*

Miss K. HOLLOWAY, Supervisor, Gerrard Exchange, to be Supervisor, Paddington Exchange.

Miss J. CAMPBELL, Operator, London Wall Exchange, to be Supervisor, Hop Exchange.

Miss B. CHARLTON, Operator, Holborn Exchange, to be Supervisor, Battersea Exchange.

Miss M. ELLIS, Operator, Bank Exchange, to be Supervisor, Gerrard Exchange.

Miss S. KEYS, Operator, Westminster Exchange, to be Supervisor, Gerrard Exchange

Miss M. LLOYD, Operator, Paddington Exchange, to be Supervisor, Gerrard Exchange.

Miss H. J. PEREIRA, Operator, Holborn Exchange, to be Supervisor, Gerrard Exchange.

Miss F. POWELL, Operator, Avenue Exchange, to be Supervisor, London Wall Exchange.

Miss L. CHAPMAN, Operator, Hop Exchange, to be Supervisor, Gerrard Exchange.

MARRIAGES.

Mr. E. T. PAYNE, Chief Clerk, Newcastle-on-Tyne, was presented by the members of the staff with a silver *epergne* on the occasion of his marriage with Miss Taylor, of Benton.

Mr. G. E. BURRELL, Inspector, Middlesbrough, was married on Dec. 3 at Redcar Parish Church to Miss M. HALDER, Operator, Redcar Exchange. They were the recipients of a handsome clock, subscribed for by the local office staff.

Mr. E. W. INGRAM, of Head Office Stores, Stationery Department, was married to Miss Best, at St. Thomas' Church, Hackney, on Saturday, Dec. 15. A wedding present, which took the form a marble timepiece, bore tangible evidence that the good wishes of 51 of his colleagues went with him at the outset of his matrimonial voyage.

Miss MARION FERGUSON, Operator at Johnstone Exchange, resigned on Dec 15 to be married. Before leaving, she was presented with a silver cake basket, subscribed for by the members of the Paisley staff.

Miss E. A. FRISBY, Senior Operator, Derby, resigned to be married. On the occasion of her resignation, the Local Manager, Derby, Mr. S. A. Young, presented her with a Carlton china tea pot, hot water jug and fruit dish, as a mark of esteem from the members of the local staff at Derby.

Miss THOMPSON, Operator, Portsmouth, has resigned to be married. Before leaving, she was presented by the staff with a silver teapot.

London Traffic Department.—*Leaving to be married:*

Miss F. Baker, Operator, Woolwich Exchange.

Miss F. Young, Operator, Paddington Exchange.

Miss E. Bounds, Operator, Dalston Exchange.

OBITUARY.

IT is with feelings of great regret that we have to record the death of Mrs. C. H. SIBLEY, the wife of the District Manager, Dublin, which took place on Nov. 24. Mrs. Sibley had been ailing for some time as the result of pneumonia, but every hope had been entertained of her ultimate recovery. As tokens of sympathy wreaths were sent to Leicester (where the burial took place) by the operating, clerical, electrical and engineering staffs. The Midland and Irish Superintendents, and the District Manager, Belfast, also sent wreaths.

Foreman JAMES BELL, who was located in the various centres of the South-West Lancashire district for a considerable number of years, died after a long illness, at Birkdale, Southport, on Oct. 3, 1906.

WHAT THE COMPANY IS DOING.

EXCHANGES have been opened during December at New Mills (Oldham district), Gresford (Chester and North Wales), Methven (Dundee), Dollar (Stirling), Rothes (Aberdeen), Great Barr (Birmingham), and Lynton (Exeter), bringing the total number of exchanges working up to 1,276; 4,105 new stations were added during November, making a total of 403,493.

PORTSMOUTH.—In connection with the underground scheme at present in progress at Gosport, with the exception of about 200 yards a complete system of ducts has been laid. Arrangements are in progress for a complete underground system in Fareham and Ryde, Isle of Wight.

PAISLEY.—An additional section for the Paisley switchboard, which is equipped in three positions—each for 60 party lines, has

just been received from the suppliers. This has been placed in position, and will be brought into use at an early date. The drawing in of the cable in connection with the underground scheme was commenced in November, and 4 miles 1,747 yards of cable are now in position.

JOHNSTONE.—Two 100-line switchboards and one 250-line testboard, which are to replace the existing 100-line switchboard and ten-party line wall pattern switchboard, have been received from the suppliers. Work is to be put in hand immediately after the New Year holidays.

HURSTPIERPOINT, SUSSEX.—The system is to be placed underground, and the work has just been started.

CARDIFF.—The town clerk and other officials took possession of the new City Hall on Dec. 3, and the complete installation of telephones fitted by the Company throughout the building was handed over to the Corporation on Dec. 12. The system in the City Hall alone comprises six exchange lines, with 29 extension instruments and 21 private lines, all working from one central switchboard.

NEWPORT.—During the last few weeks the following cables in connection with the underground work have been drawn in:—Composite cables: 600-pair, 371 yards; 400-pair, 69 yards; 200-pair, 103 yards. Between the exchange and High Street bridge, 10-lb. conductor cable: 600-pair, 222 yards; 400-pair, 555 yards; 200-pair, 630 yards; 153-pair, 235 yards; 100-pair, 750 yards; 50-pair, 1,142 yards; 14-pair, 227 yards. A new 300-pair cable recently laid between the exchange and the Pilgwenlly district has been brought into use at several points, and the work in connection with the new distributing poles at other points is rapidly being pushed on with.

BOLTON.—Eleven orders have been secured for private branch exchanges, the largest being for five junction wires and eleven extensions, to be installed at the works of Messrs. Dobson & Barlow, Ltd., the well-known textile machinists.

EASTBOURNE.—The work of fitting one 300-line three-position party line switchboard section, and one three-position relay rack at this exchange has now been completed.

SWANSEA.—*Reconstruction*.—1,560 yards of cable have been drawn into existing pipes at Swansea, and this will be continued by means of overhead cable to the outlying districts.

NEATH.—*Underground*.—The laying of conduits and cement blocks has commenced.

DOVER.—An underground extension scheme of considerable proportions is now nearing completion. Thanks to the introduction of 10-lb. conductor cables, the expense of increasing ducts in some directions has been obviated. The number of distributing poles has been increased from two to sixteen, with a duct mileage of 2 miles 1,000 yards, and cables varying from 14 to 600 pairs throughout.

LONDON.—*Bedford Hotel*.—A private branch exchange has been opened at the above hotel, with 236 stations and eight lines to the Gerrard Exchange. The common battery branch switchboard is fitted for two operators.

East Ham.—A building has been started for a new exchange, in which common battery equipment (No. 9 type) for 460 lines is to be installed.

Tottenham.—A building has been started for a new exchange, in which common battery equipment (No. 9 type) for 640 lines is to be installed.

POLLOCKSHIELDS.—The installation of the new equipment for 340 lines has been commenced.

ARGYLE.—An extension of the switchboard by 690 lines has been placed on order.

BRISTOL.—An order has been placed for an extension of the common battery switchboard by 1,540 lines.

STAFF GATHERINGS AND SPORTS.

London (*East Exchange*).—At East Exchange on Wednesday evening, Nov. 28, a social evening and concert was given by the operating staff of the district. Mr. C. B. Clay, Metropolitan Superintendent, presided, and a very pleasant evening was spent. The success of the programme was greatly due to the following, who kindly contributed towards the entertainment:—Mr. Macgregor (North), Mr. H. Taylor (Hop), Mr. S. Chapman (Gerrard), and members of the Eastern district staffs. Thanks were also due to those who assisted with the refreshments and decorations. One item on the programme was somewhat novel, namely, a Spanish dance, executed by two of the staff. At the conclusion of the programme Miss K. Pring, on behalf of the operating staff, passed a vote of thanks to Mr Clay for presiding, and was heartily supported by all present. *Mr. Clay, in replying, congratulated them on the results achieved by the unaided efforts of the Eastern staff.* These encouraging remarks were greatly appreciated, more especially as the gathering was the first of its kind held in the district.

Clay Football Challenge Cup (First Round): Southern v. Head Office.—A keen bustling game was the outcome of this meeting at Dulwich on Dec. 1. It was *not a highly scientific display, but there was no lack of individual skill*, and both sides stayed well throughout a strenuous 70 minutes, at the end of which Southern were proclaimed winners by six goals to *nil*. The win was well deserved, though hardly by the margin stated. Southern superiority was chiefly in the forward line, and this accounted for the great difference in the score. Individually, Head Office played with any amount of dash and energy, but collectively they were not impressive.

Semi-Final: City v. Western.—This match was played at Walthamstow on Saturday, Dec. 15. A few notes on the game are appended. The Western gave a fine display, and in the end were deservedly proclaimed winners by a substantial margin. From the very start of the game it was seen the Western men had made up their minds to go all the way. From goalkeeper to centre forward there was a briskness *in the play which spelt success, and what is more* to the point, this form was maintained right through the chapter. Although City were beaten, they gave time and again glimpses of that skill that placed them in the semi-final. Marshall was the best of the City half-backs, and credit must be given to Bass for his untiring exertions displayed at back. Every man of the Western side played excellent football, and it would be a matter of difficulty to particularise.

Guildford.—On Nov. 28 about 50 members of the district staff and their friends met together for a social evening. This was the first venture of this kind ever held in the district, and it was a great success. It was deeply regretted that Mr. Potter, the district manager, was unable to be present. Mr. Best made a capital chairman, and the evening was pleasantly spent in dances, games, vocal and instrumental items, etc., including a short sketch written by Mr. A. H. Lindop, of the district office staff, in which he and Messrs. F. G. Harris and L. G. Cosh took part. The following members of the staff contributed to the programme:—Miss Carr (piano), Messrs. A. H. Lindop and T. H. Patrick (songs) and J. R. Black (recitation). Mr. J. R. Black acted as secretary.

Hull.—The annual whist drive and dance in connection with the Hull staff was held recently at the Central Hall, Pryme Street. There were 25 tables engaged in whist, for which six prizes were given. The first ladies' went to Miss Dyson, and the second ladies' to Mrs. Kitchen; the first gentlemen's was taken by Mr. Gomersal, the second gentlemen's by Mr. Whitham; whilst the booby prizes were captured by Miss Kay and Mr. Barrick. After whist supper was provided in the long room. Much beauty was added to the scene by the introduction of limelight effects into several of the dances. The programme all too soon came to an end at 2 a.m., all being unanimous in voting the function a huge success.

Leicester.—The fourth annual whist drive of the staff was held at the Oriental Cafe on Dec. 4, the company at the tables numbering 120. Mr. John Ashton (district manager) welcomed the friends of the staff, and congratulated the organisers in bringing the proceedings to such a successful issue. The ladies' first prize was won by Miss Bilney, and the gentlemen's by Mr. F. J. Jowers.

Nottingham.—*Football: Factory v. District Office.*—A match was played on Nov. 24, before a good crowd of spectators, between the Factory and the District Office. *The Factory were much the better team throughout, and won* easily, 4—1; bad shooting alone preventing them from scoring more goals. The goals were scored by Wilcockson (3) and Shephard for the Factory, and Hawkins for the District Office. Mr. Fenton (factory manager) kindly kicked off.

Blackburn.—The fourth annual social gathering in connection with the district staff was held on Dec. 7 in Taylor's Assembly Rooms, Blackburn. There were 80 present, all the out-centres being represented. A thoroughly enjoyable evening was spent. Unfortunately, Mr. Remington, the district manager, was unable to attend owing to an attack of influenza.

Accrington.—The fourth annual dance of the Accrington staff was held on Nov. 21 in the assembly hall of the Accrington Liberal Club. It was a most successful gathering, over 100 being present.

Luton.—A football club has been formed by the staff of the district and local offices at Luton and has met with success, two of the three matches played having been won.

Bolton.—An interesting football match took place on Saturday, Dec. 15 between the Bolton district office staff and Messrs. Magee, Marshall & Co. Ltd. A very exciting game ended in a draw. Both teams and their friends dined at the Red Lion Hotel, a most enjoyable smoking concert following.

Leeds.—The staff held their annual social gathering and dance at the Masonic Hall on the evening of Dec. 14. Mr. A. Watts, of the engineer-in-chief's department, Mr. and Mrs. Drummond, of Newcastle, and representatives attended from the Dewsbury, Harrogate, Otley, Wakefield and other centres of the Mid. Yorks district, about 160 being present. The M.C.'s duties were admirably carried out by Messrs. Peacock and Taylor, and altogether a most enjoyable evening was spent.

Brighton.—*Football: London v. Brighton.*—On Dec. 1 the long talked of visit of Metropolitan staff to Brighton took place, when a football match was played in Preston Park, resulting in a win for London by *one goal to none, the goal* being scored by Ashburner. The meteorological conditions were perfect, and the game had a good many interested spectators, including most of the Brighton district office staff, and the majority of other departments. Among those who journeyed southwards from London were Messrs. Harvey Lowe (chief accountant), H. Davis (*Metropolitan stores manager*), I. Bryson (chief of rental department), A. Gray (statistical officer), J. Brown, D. Stuart, Ryall, Bascombe, G. K. Cherry, H. G. Corner, Pegden, Guest, and Lacroix. The visiting

party mustered about 50 strong. At the close of the game an admirable tea was served at Chatfield's Hotel. Mr. F. W. Taylor, gave the visitors a hearty welcome, and, in the course of a brief address, presented the winning team with a cup, which had been provided by the Brighton staff for the occasion. The cup is now safely lodged at Salisbury House, and the London staff hope to give their Brighton friends an opportunity of winning it back on some future occasion. An excellent musical programme was gone through, supplemented by some step dancing by the Brothers Watson, Before dispersing Mr. Harvey Lowe briefly acknowledged Mr. Taylor's remarks, and a vote of thanks was passed to the reception committee, which was replied to by Mr. F. W. Roberts, Brighton local manager.

Birmingham.—A progressive whist drive was held in Birmingham on Nov. 30, at which about 150 members of the staff and friends were present. The prizes were distributed by Mr. R. U. Tucker, Chief Clerk, who also presented, on behalf of the staff, a silver-plated cake basket to Mr. C. Robins Piercy as a mark of esteem. After seven years with the Company Mr. Piercy has now left the service.

Sheffield.—A very enjoyable evening was spent at the Foresters' Hall on Dec. 12 last, when about 80 members of the staff and friends took part in a whist drive. During the interval, and also before the commencement, phonograph selections were given under the management of Mr. W. A. Skinner.

Preston.—The inside staff held their fourth annual dance on Dec. 5. The staff and guests present numbered about 130, including Mr. Lemon, the district manager. The whole of the arrangements were ably undertaken by the Misses Chadderton, Johnson and Cumming. The outside staff also held a social evening on Dec. 17 at the Hotel National, Preston. The chair was taken by Mr. Arthur, the local engineer. The Post Office were represented by Mr. Foster, their head foreman. Songs were contributed by several members of the staff and a very merry evening was spent.

Manchester.—The operating staff held the first of the annual series of dances on Saturday evening, Dec. 8, in the marble hall at the Albion Hotel. The dance was a success as usual, and another one will be held on March 23, 1907.

LOCAL TELEPHONE SOCIETIES.

London.—The third meeting was held on Dec. 17, Mr. C. Elliott taking the chair. A most interesting paper was read by Mr. Deane, entitled "Call Wire and Junction Working." Messrs. W. Corner, W. Collings, W. Benham, W. W. Cook, J. Stewart and J. F. Edmonds taking part in the discussion which followed.

Birmingham.—At a meeting on Dec. 6 Mr. H. Laws-Webb delivered a lecture entitled "Telephony on the Continent," under the chairmanship of Mr. A. E. Cotterell, vice-president. The audience was intensely interested in the lecturer's lucid descriptions of the exchanges he had visited and the methods of working them. The lantern slides which illustrated the lecture were greatly appreciated.

Glasgow and West of Scotland.—The second and third meetings of the session were held in the Glasgow Technical College on the evenings of Nov. 21 and Dec. 5. The paper on Nov. 21 was read by Mr. T. Rodger, the Glasgow district traffic superintendent, his subject being "Traffic Organisation," while that on Dec. 5 was by Mr. A. M. Watt, the Glasgow district cost clerk, whose subject was "The Office and some of its Functions." Mr. Rodger dealt in an interesting and instructive manner with the duties of the various members of the traffic department staff and their relation to one another, and to the service generally, and illustrated his remarks by blackboard and other diagrams. Mr. Watt's excellent "Office" paper dealt with that branch of the Company's work from the point of view of the cost clerk, and his remarks were followed with appreciation by the members present. On each occasion full discussion on the points raised in the papers was engaged in by the members.

Brighton.—The second meeting of the session of this society was held on Dec. 3, when Mr. S. J. Pharo, exchange manager, Portsmouth, gave a lecture on the subject of "Operating and its Cardinal Points"; 96 per cent. of the total membership attended and heard a highly interesting address, which was followed by a full and useful discussion. The third meeting was held on Dec. 17, when Mr. Roberts, local manager, presided over a good attendance of members (the percentage being 70.) A paper was read by Mr. Legge on "Underground Construction." The subject was suitably illustrated with diagrams, and the paper was followed by a discussion, to which Mr. Legge replied.

Portsmouth.—The third meeting of the session was held on Dec. 13, Mr. Stirling, district manager, presiding over a good attendance of members. A paper was given by Mr. R. J. Parsons on "The District Office and its Work." Mr. Parsons dealt with the various phases of district office work in a very exhaustive manner, and his paper was much appreciated. Mr. H. Higgins, canvasser, and Mr. F. Albany, contract agent, gave papers on "Contract Department Working." Mr. Higgins dealt with the subject in detail, and Mr. Albany, during the course of his remarks, illustrated the work of the contract department in Portsmouth by means of a series of curves.

Leicester.—The inaugural meeting of this society was held on Dec. 14 at the Leicester Y.M.C.A., a muster of 90 per cent. of members attending. The president, Mr. John Ashton, made an excellent introductory speech, explaining that whilst the object of the society was primarily to help the younger members of the staff to a fuller understanding of the work they were engaged in, he hoped the society would be of assistance to all connected in the important service to which they belonged; this, he explained, would be attained if each took an active interest in every meeting, and gave personal support as well as financial, by taking an active part in the debates. Mr. Marsden, chief inspector, gave an interesting analysis of a sub-exchange, explaining by diagrams the various connections, and also gave a brief description of general instrument faults and how to remedy them. The following is the syllabus of the Leicester society:—Dec. 14: President's introductory address; "A Sub-Exchange Analysis," M. Marsden. Jan. 11: "Party Line Working and Maintenance," E. Rendell; "Underground Work," J. Bagley; "The Test Room," P. V. Sansome. Jan. 25: "Transmission Limits (as specified by Post Office),"

Leonard Price. Feb. 8: "The Works Order," H. Marshall; "The Apprentice," S. Coles; "The Subscriber's Point of View," K. O. Ashby. March 8: "Hints," J. Ashton; "Mathematics of Line Work," E. L. Hague; "Stores," G. E. Thorpe. April 12 (ladies' night): "Operating," Miss M. Law; "The Sinews of War," Miss M. Barr; "Call Office Records," Miss N. Jackson. A special meeting will be announced in due course for a lecture by H. Laws-Webb, Esq.

Blackburn.—The fourth meeting took place in the Weavers' Association Rooms on Dec. 14, when Mr. Storey, Accrington, read a paper on "Electrical Testing as Applied to Telephone and Telegraph Lines." The paper was a most interesting one, and was illustrated by a number of well-executed diagrams. Unfortunately, however, owing to the inclemency of the weather, and the prevailing epidemic of influenza, the meeting was not attended so well as the previous ones.

Manchester.—On Nov. 23 a most interesting and instructive paper was read by Mr. J. M. Shackleton on "Economical Construction." There was a first-rate discussion afterwards, and, as usual, Mr. Shackleton was as happy in his replies to the various points raised, as he was in the paper itself. The paper was illustrated by specially-prepared diagrams. On Dec. 8, a capital paper was read by Mr. W. B. Cheetham (Oldham district) on "Electric Light and Power Distribution." Mr. Cheetham fully described the methods of driving by pulleys and belts, and illustrated them by lantern slides. He also showed on the screen a table giving the comparative costs of gas and electricity. The paper was followed by a most interesting discussion.

Swansea—At the meeting of the general society on Dec. 3 the district manager (Mr. W. E. Gauntlett), owing to the unavoidable absence of the assistant engineer (Mr. Smith) through illness, read Mr. Smith's paper on "Underground Construction." An interesting discussion ensued.—On Dec. 5 the operators' society held its third sessional gathering, when an interesting and instructive paper was given by A. G. Bristow on "Phases of Telephone Service." An excellent meeting resulted.

Bradford.—The first meeting of the Bradford society was held on Nov. 21, when a paper was read by the contract agent, Mr. T. W. Jowett, on "Contract Office Relations to other Branches of Service." About 40 members were present, and listened with interest to the paper which dealt with canvassing methods generally, and ways in which this department could assist and be assisted by other departments. Figures were given showing the growth of the Company's business in West Yorkshire district.

Coventry.—A meeting of the members of the South Midland district telephone society was held on Nov. 26, when an address upon "The Objects and Aims of the Society," was given by Mr. John Mewburn, district manager. After which the election of officers took place, Mr. Alfred Coleman was nominated as president, and Messrs. J. Mewburn, W. Dickinson, and J. N. Lowe were elected vice-presidents, and Mr. W. H. Oliver, secretary and treasurer. On Monday, Dec. 17, the second meeting of the above society was held at the Priory Assembly Rooms, Coventry, when a paper was given by Mr. W. Dalton, engineering inspector, on "Sound." Mr. Alfred Coleman, provincial superintendent, presided over a well-attended meeting, there being present 33 members of the staff. An interesting discussion followed. The syllabus for the season is as follows:—Nov. 26: President's address. Dec. 17: "Sound," W. Dalton. Jan. 14: "The Relationship of the Local Office to the District Office," C. Saddler. Feb. 18: "Transmission of Speech," S. H. Ings. March 11: "Construction of Central Battery Board, Birmingham" (with lantern illustrations), A. Coleman, jun. April 8: "Construction of Open Wires," J. N. Lowe. April 29: Short paper evening. Papers will be read by W. W. Stewart, A. Kelly, E. E. Sleath, and Miss Read. May 13: Paper by R. U. Tucker and W. Dickinson.

Luton.—A telephone society has been formed and, although the membership is perforce small, great interest is being taken in the movement, and good results are anticipated.

Cardiff.—The second meeting was held at New Street on Dec. 11, the vice-president, Mr. B. Waite, occupying the chair. A valuable paper on "Switchboard and Instrument Faults and How to Clear Them" was read by Mr. A. Siberry, Local Manager, Newport, to an appreciative audience. A useful discussion ensued. The following is the syllabus:—Nov. 13: "Departmental Co-operation and some Questions of Finance," R. A Dalzell. Dec. 11: "Switchboards and Instrument Faults and How to Clear Them," A. Siberry. Jan. 8: Miscellaneous (open). Feb. 12: "The Planning and Carrying Out of an Underground System," B. Waite and J. James. March 12: "Outside Construction," W. Edwards. April 9: "Motors and Dynamos," F. F. Whetton.

Newcastle-on-Tyne.—The second meeting of this society was held on Nov. 22 with a good attendance of members, including many from Sunderland, South Shields and Morpeth. Papers were read by Mr. C. Ratcliffe on "The Newcastle Exchange Equipment," and Mr. J. Gwyther on "The General Service." Mr. Drummond occupied the chair.

Sheffield.—The third meeting of the electrical society was held on Dec. 19. Owing to illness, Mr. J. Hyde had not been able to prepare his paper on "Central Battery Working." In place of this two short papers were read, the first on "Loading Telephone Lines," by E. J. Johnson, and the second entitled "Notes on Post-Office Line Construction," by A. Broomhead.

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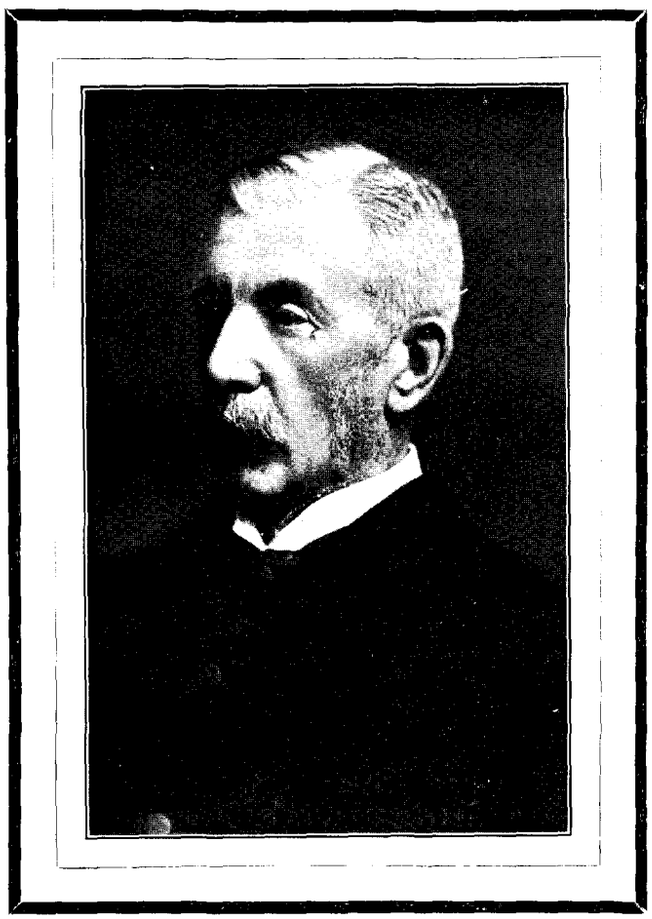
TELEPHONE MEN.

IX.—SIR JAMES FERGUSSON.

THE Right Hon. Sir JAMES FERGUSSON, Bart., P.C., K.C.M.G., G.C.S.I., met with a tragic death in the earthquake at Kingston, Jamaica, last month. It is with deep regret that we have to interpose in this series of biographies of telephone men an obituary notice of one of the Directors of the National Telephone Company, whose ripe experience, great administrative capacity, and old-world courtesy had greatly endeared him to his associates in the telephone world. Sir JAMES FERGUSSON had had a long and varied career, covering a field of activities which provides a record worthy of a conspicuous place even among the many records one meets with of the long and active lives of English men of action. He was born at Edinburgh in 1832, and was educated at Rugby and at University College, Oxford. At the age of seventeen he succeeded to the title and became sixth baronet of Kilkerran in Ayrshire; he left Oxford in 1851 and joined the Grenadier Guards, in which regiment he had served for three years when the Crimean War broke out. He was on active service during the whole campaign, and took part in the battles of the Alma and Inkerman, where he was wounded, and in the siege of Sevastopol. While in the Crimea Sir JAMES was elected to Parliament for Ayrshire, and in 1856 he retired from the army, and began his life-long association with Parliament, in which he has represented several constituencies. In the Conservative Ministry of 1866 he held office as Under-Secretary for India, and later as Under-Secretary for the Home Department. In 1868 he was sworn of the Privy Council and appointed Governor of South Australia. This position Sir JAMES filled with success until 1873, when he became Governor of New Zealand. In 1875 he resigned and came home with the intention of re-entering Parliament, but he was unsuccessful at Frome in 1875, and at Greenock in 1878. In 1880 he was appointed Governor of Bombay, in which high position he remained until 1885.



In the spring of 1885 Sir JAMES FERGUSSON returned to England, and in November was elected to Parliament for the North-East Division of Manchester by a large majority. Sir JAMES held this seat against all comers for over twenty years, finally succumbing in the political earthquake of last winter. In the Ministry of 1886 he was appointed Under Secretary for Foreign Affairs, and for five years he was Lord SALISBURY's spokesman in the House of Commons. In 1891 he was promoted to be Postmaster-General, which office he held until the resignation of the Government in 1892.

In 1896 Sir JAMES FERGUSSON, who was already a Director of the Royal Mail Steam Packet Company and of several other large companies, joined the Board of the National Telephone Company, and his great experience as a man of business made him a valuable counsellor during a difficult period of the Company's existence, but before his untimely death Sir JAMES FERGUSSON had the satisfaction of seeing the National Telephone Company emerge successfully from these difficulties, and enter on a period of accelerated development and increased public usefulness.

INSPECTORS: THEIR TRAINING AND QUALITIES.

By MELTON MARSDEN, *Leicester.*

WHAT constitutes a good inspector? The points raised by this question are numerous. In the first place, I may say that to achieve the best results the future inspector should be taken into the service immediately he leaves school; preference being given to strong, healthy youths of good parentage, and to those who have had a somewhat higher education than that to be obtained at the ordinary council school.

At the very commencement of his career the future inspector should make a point of studying and mastering all the subjects that will be of any practical value to him in future in his capacity of telephone man. If these important studies are at first shirked, more often than not they are neglected always. And when it is too late, he who has shirked early study will find, however good his practical abilities may be, that he is being left behind by those of his colleagues who had the good sense to pave the way to success by mastering the subjects recommended for study.

Personally, I think the best plan is to give the juniors a thorough training in all the electrical departments. Chief electricians should, whenever possible, make a point of encouraging them by taking an interest in their progress, and should see to it that the departments having youths in training are doing their reasonable share in moulding the future inspector.

Upon his arrival into the instrument department, the learner should be first sent out with a smart fitter, and then with a good faultsman. Both these men should be chosen on account of their records for steadiness, sobriety, and the good quality of their work, as the youth's future to a great extent will depend upon this early training.

The chief inspector should see in all young members of his staff a possible good man, and to achieve this, should be sharp to notice their progress, giving praise when praise is due, and at the same time never permitting carelessness, bad work, or other breaches of discipline to pass unremarked; above all he should personally help and advise promising youths whenever necessary.

It is now assumed that the learner has picked up much useful and practical knowledge while working with the two senior men, and is now trusted by himself with simple duties. As time goes on, if he is industrious and persevering and has taken to heart the points impressed upon by his chief, he becomes a first-class man, and as such amply repays the time and trouble spent upon his training.

Having trained the inspector let us expect the following from him. That he be always punctual, clean and tidy in appearance, polite, methodical, and painstaking in the carrying out of his duties. That when taking up a fault he shall never be satisfied with just removing the cause of trouble complained of, but while at the subscriber's end shall overhaul the whole apparatus. Future trouble is often prevented by this practice, to say nothing of the time saved by thus rendering unnecessary a second journey in the near future.

The inspector, whenever advised that a strong complaint has been made, should if possible see the person who has made it, and get that person to describe the trouble. When the subscriber has finished the inspector should impress upon the subscriber that he can remove the trouble, and will soon get things right. Having thus gained the subscriber's confidence to a certain extent, the inspector should follow this up with a thorough survey of the instrument, apparatus and wiring, and when the fault is localised and removed, he should make all clean and tidy and advise the subscriber, at the same time asking him to use the instrument before he leaves.

Before departing the inspector should promise to ring up the next day to ascertain whether the working has been satisfactory. The next day *he should do so.* This attention flatters the subscriber, gives him a good impression of the Company, through its inspectors, and, not the least important, has the effect of considerably reducing the number of faults. Repeat faults in a district controlled by such an inspector are practically non-existent.

An important point is that the inspector should be prompt to notice when instruments are receiving rough usage, or where the telephone is not being used properly. In the former case a repetition of this evil will often be prevented if the principal or manager of the employees concerned is tactfully approached. As regards the latter trouble, a few minutes spent in practical demonstration are never wasted. It should be impressed upon all party line users, for example, that the telephone must not be taken from the rest until the ringing actually ceases, as otherwise false calls are given.

I have known several inspectors who, because they followed the methods described, were frequently demanded by certain subscribers, and were looked upon with confidence by the remainder of the subscribers in their districts. They all adhered to the above methods, and in addition had a pleasant way of discussing a complaint with a subscriber without becoming familiar, and never gave offence by openly contradicting a subscriber's statement. Experience teaches that it is best to be diplomatic when dealing with subscribers with imaginary or exaggerated troubles.

REVIEW.

The Practical Electrician's Pocket Book and Diary for 1907.—Pocket size ($5\frac{1}{4}$ by $3\frac{1}{2}$) 319 pp. with diary, detachable requisition and estimate forms, etc.; edited by H. T. CREWE, M.I.M.E., published by S. Rentell & Co., Ltd., 36 Maiden Lane, Strand, London, W.C. Price 1s. *net.* This is a capital little book, containing a vast amount of useful information relating to electrical and mechanical plant, clearly written, well arranged, and well printed and illustrated. Information may be found in it on almost every branch of electrical engineering and there are numerous tables that will be found very handy for ready reference. It is the best shillingsworth of electrical literature we have seen for a long time.

A FIFTH OF NOVEMBER FAULT.

ON a route at Altrincham, South Manchester, composed of dry-core aerial rubber-covered cable and open wires, ten subscribers' lines were reported out of order on Nov. 6. The open wire portion of the route was gone over, and all wires tested "O.K.", thus narrowing the fault down to a mile of cable, which was examined at each pole along the route, but no damaged could be traced.

Four spans of the route are over fields and while examining these spans a miniature cannon, mounted on a small gun carriage, was observed almost immediately under one of the spans and the cannon appeared to have been recently fired. A ladder was erected and a careful survey made of this particular span, when it was found that a piece of the outer covering of the cable had been torn away by a very vicious-looking projectile, and twenty of the wires severed. Ladders were at once erected and a jointer got to work to repair the damage as expeditiously as possible.

A NOVEL FIRE ALARM.

THE *Scotsman* of Jan. 9 contained a paragraph under the above heading. It was stated that early on the previous morning the Edinburgh Fire Brigade were called to extinguish an outbreak of fire at the house of Dr. Philip, 45, Charlotte Square. The fire was discovered in rather an extraordinary way About three o'clock Dr. Philip was awakened by the violent ringing of his telephone bell. On going to the instrument he received no reply to his enquiries, but he soon discovered the reason of the ringing. The house was on fire, and the noise was due to the intense heat having fused the internal wires, and created a short circuit between the electric lighing installation and a gas pipe. Seeing the peril in which his family was placed, Dr. Philip speedily wakened the members of his household who, for a time, found shelter in the basement. The house was structurally damaged to a considerable extent, and a great deal of the furniture and furnishings destroyed, both by fire and water. Fortunately, Dr. Philip and all of his household escaped without any harm befalling them.

A WELL-KNOWN Tyneside shipowner, who rarely attends his office, made a visit recently while a telephone inspector was leaning over his desk examining the terminals of his pedestal block.

"Get me the paper," said the shipowner.

"Paper? What paper, sir?"

"The *Chronicle*, of course."

The inspector went into the general office and returned with the local newspaper.

"Thank you! Don't remember your face. How long have you been here?"

"Five minutes, sir."

"Five minutes?"

"Exactly, sir. I'm not one of your clerks, I'm the telephone man."

A telephone man is nothing if not accommodating.

THE TELEPHONE OPERATOR AT SCHOOL.

BY W. M. FRANCE, *Head Office*, and J. F. EDMONDS, *Metropolitan Traffic Manager.*

THE selection, education and training of the operating staff for a large telephone area constitute one of the most interesting and important branches of a telephone organisation, and it is one which presents many problems to a traffic manager. By education and training is meant not only tuition in the practical work of operating and instruction in the various rules and regulations, but also the forming of correct telephone manners, or what may be termed the ethics of telephone service, in the student operators' minds.

It may be of interest to mention that the first operating school was opened in London in August, 1899, and it was then that the first organised tuition of telephone operators was commenced. Since that date much attention has been devoted to the subject, and although it is not yet possible to say that nothing further remains to be done, many improvements have been recently effected, and the organisation placed on a sound basis.

In the following pages it is proposed to give a short account of the methods which have been adopted in London by the National Telephone Company for the training of operators in the new school which was opened in November, 1906, at the Company's London Wall premises.

The arrangement of the rooms set apart for this work is shown in Fig. 1, and consists of :—

The operating switchroom, which is equipped with up-to-date central battery apparatus, together with a few magneto positions, for the practical instruction of operators in all branches of operating.

The Examining Matron's office and examination room for the interviewing and examination of candidates respectively.

Lecture and study rooms fitted with desks, blackboards, charts and samples of subscribers' apparatus.

The equipment consists of :—

Four calling monitors' desks, each monitor controlling three of the "A" positions. Nine central battery and three

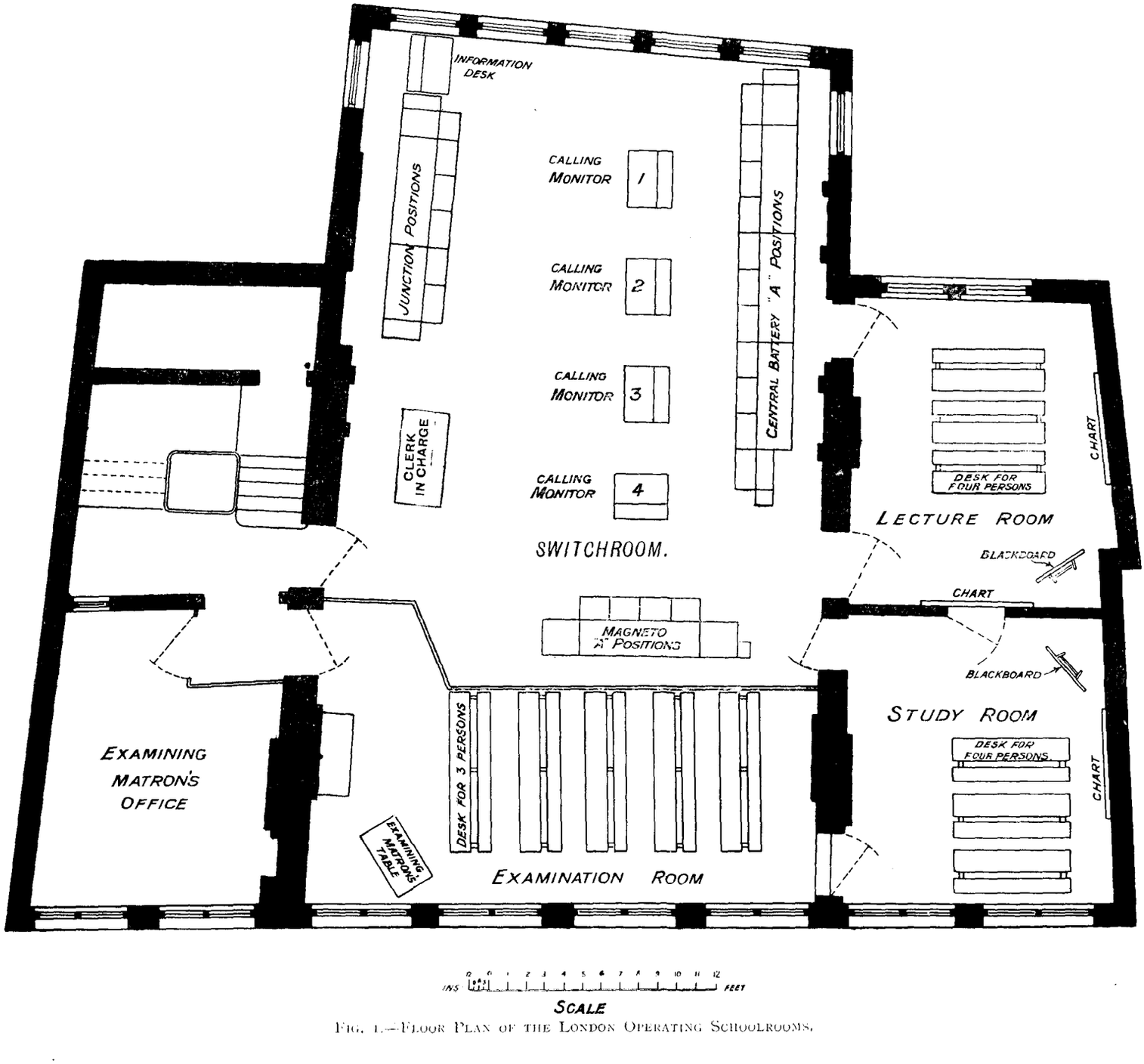


FIG. 1.—FLOOR PLAN OF THE LONDON OPERATING SCHOOLROOMS.

magneto positions for "A" operators. Four central battery positions for "B" operators. One information monitor's desk, and one clerk-in-charge's desk.

The positions for the "A" and "B" (*i.e.*, the subscribers' and junction) operators represent in all essentials typical working positions in large central battery and magneto exchanges. Pending the transfer of certain exchanges to the central battery system, it has been necessary to equip a proportion of the positions for magneto working, so that the training of operators for these exchanges may continue, but allowance has been made in the fitting up of the school for them to be replaced in due course.

The calling monitors' desks are each fitted with 30 lines cords, one combination listening and ringing key, one service register key and two supervisory signals), 30 order wire keys, one extra service register key for ineffective calls, and one combined order wire and party-line ringing-key.

The usual pilot lamps are provided, viz., one in each panel, in connection with the subscribers' calling signals; one with a cap engraved R, lighting on the depression of a register key; one with a red cap, lighting on the depression of certain order wire keys, to represent outer London exchanges; and one with a green cap, being the calling signal for the instruction circuit. Answering jacks and lamps for ten subscribers' lines are fitted on each "A" position. There is a subscribers' multiple of 2,000 lines, multipled every nine

FIG. 2.—GENERAL VIEW OF SCHOOL SWITCHROOM.

terminating on jacks and lamps which represent subscribers' lines. These are connected to the answering jacks on the three operators' positions immediately in front of each of the desks, so that each operator has ten subscribers' lines on her position. Each calling monitor has eighteen pairs of cord circuits with listening keys and supervisory signals.

The connections of the cord circuits are shown in Fig. 3. These are similar to the "A" positions, with the exception that only a listening key is provided instead of combined ringing and listening key and the register key is omitted.

Each central battery "A" operator's position is equipped with:

Six cord circuits (each consisting of two plugs and

panels in front of the "A" operators, and every six panels in front of the "B" operators; 120 per multiple of these are actual spring jacks and connected up, the remainder being imitation jack strips only. These imitation jacks are of the same outward appearance as ordinary jacks, and have the usual test-bushes, but no springs. An outgoing junction equipment of 130 multiple jacks is fitted, multipled every six panels. There are three order-wire junction positions, each equipped with 27 cord circuits (consisting of plug and cord, two-party ringing key and clearing lamp) and one ringing junction position with twenty cord circuits. The three "A" operators' positions representing magneto exchanges are fully equipped, two of them representing the hand-restoring and one the self-restoring indicator systems.

The connections of the connecting cords of the "A" operators' central battery positions are shown in Fig. 4.

It will be seen that these connections are the same as the regular "A" operators' positions in the Company's central battery exchanges, which have been fully described in previous articles on telephone exchange equipment.

The connections of the cord circuits on the magneto positions are the same, with the exception that the supervisory lamps

CALLING MONITOR'S DESK CORD CIRCUIT.

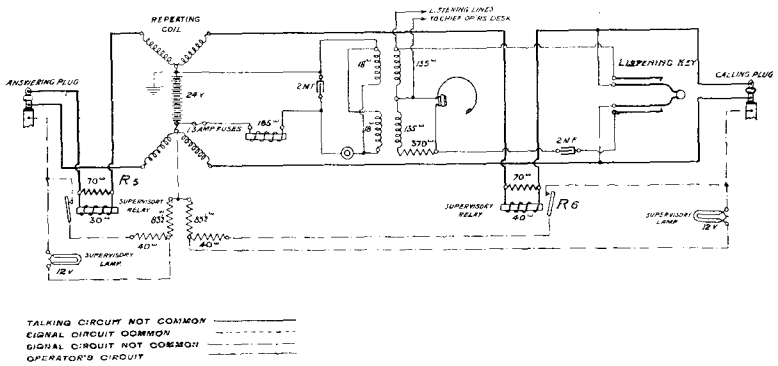


FIG. 3.

are replaced by an indicator either of the hand or self-restoring type.

The line circuit from the calling monitor's desk to the central battery "A" positions is shown in Fig. 5. The connections of this circuit differ considerably from the standard central battery line circuit as, owing to all lines being internal, it has been possible to dispense with the line relay and to insert the calling lamp direct in the line. The two 80ω resistances C1 and C2 are placed in the line to give the correct amount of current to the calling lamp, and to reduce the current through the cord circuits when these are in connection with the line.

It will be observed that the line is crossed so that the short spring of jack J1 is connected to the long spring of jack J2. This is necessary in order that the supervisory relays of the monitor's and "A" operators' circuits shall be operated when a connection is set up.

LINE CIRCUIT.

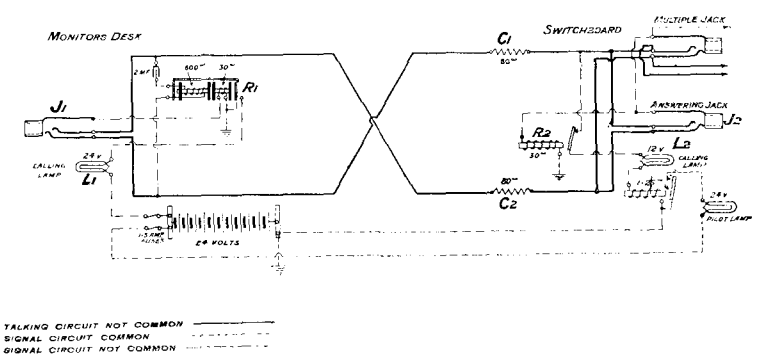


FIG. 5.

The operation of the circuit is as follows:—

Calls incoming to the monitor are indicated by the lighting of lamp L1.

The relay R1 is operated when a ringing current is sent over the line from either an "A" or "B" position, and its armature falls and completes the lamp circuit.

Upon the calling monitor inserting a plug of one of her cord circuits (Fig. 3) into the jack J1, current flows from the sleeve of

CONNECTING CORD CIRCUIT, "A" OPERATOR'S POSITION.

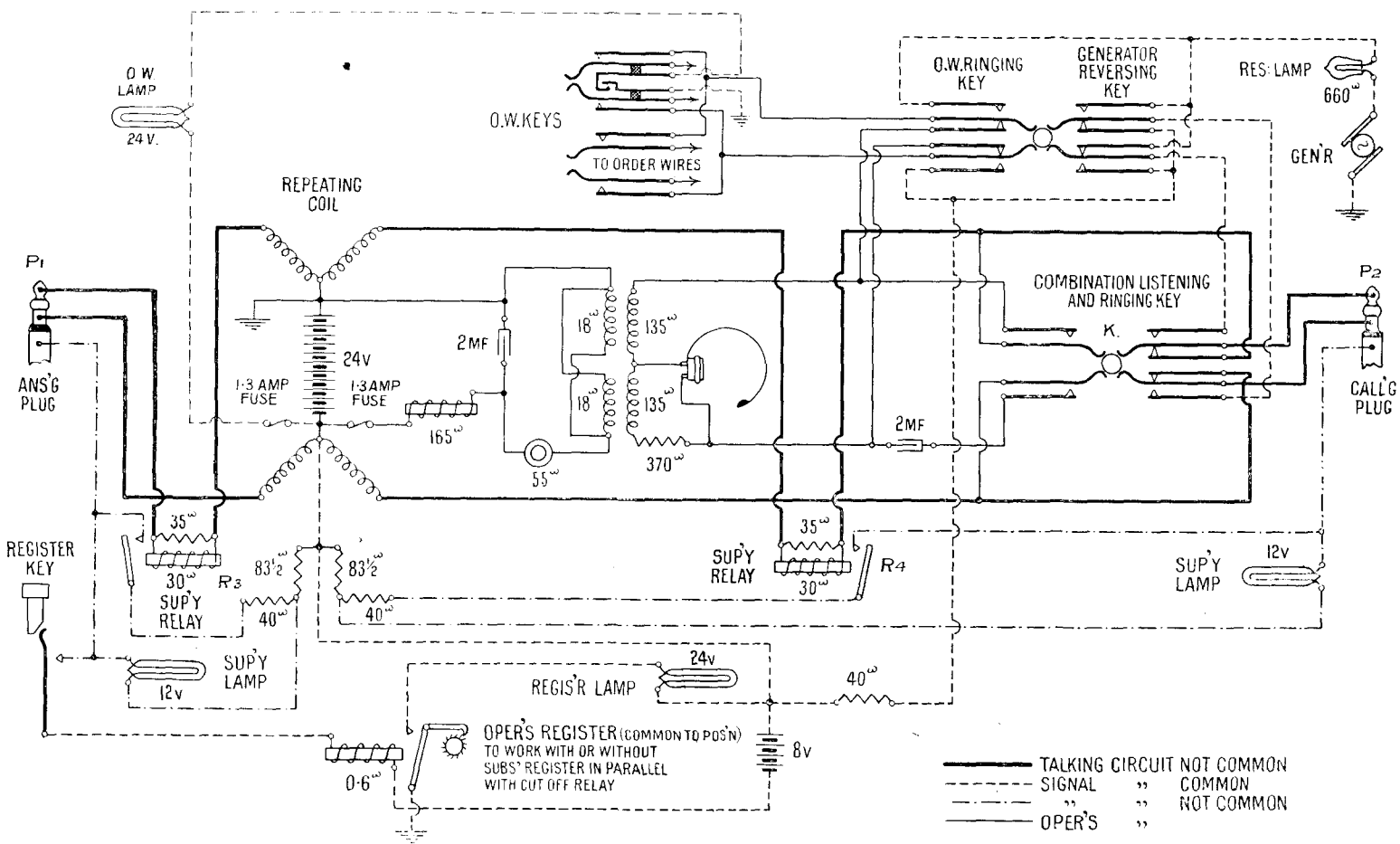


FIG. 4

the plug through the 30ω winding of the relay R1, which completes the supervisory lamp circuit of the cord and at the same time restores the relay to its normal position.

When the calling monitor desires to originate a call, she inserts the plug of one of her cord circuits into the jack J1 and moves the listening key. This allows current to flow from the negative pole of the battery through one side of the repeating coil, the long spring of the jack J1, the 80ω resistance C1, the outer contact and armature of relay R2, the 12-volt calling lamp and pilot relay to the earthed side of the battery. This causes the calling lamp L2 and the pilot lamp to glow.

When the "A" operator inserts the answering plug P1 of one of her cord circuits (Fig. 4) into jack J2, current flows from the sleeve of the plug through the cut-off relay R2 which is operated and cuts the lamp out of circuit. At the same time current flows from the calling monitor's cord circuit, the short spring of jack J2, the tip of the answering plug, the supervisory relay R3 and one winding of the repeating coil to the earthed side of the battery. This causes the supervisory relay R3 to be operated, and the supervisory lamp associated with it to be extinguished.

Current also flows from the negative pole of the battery through one side of the repeating coil of the "A" operators' cord circuit, the long spring of jack J2, the 80ω resistance C2, the short spring of jack J1, and thence to the earthed side of the battery through the tip of the plug and supervisory relay R5 of the calling monitors' cord circuit. This causes the supervisory relay in connection with the cord to be operated, and the supervisory lamp associated with it to be extinguished.

The "A" operator, having inserted the answering plug into the jack, moves the listening key K in connection with her cord circuit into the listening position, and ascertains the calling monitor's requirements.

If the number wanted represents a local subscriber she inserts the calling plug of her cord circuit into the multiple jack of the line required (having first tested and found the line disengaged), and rings with the ringing key in the usual manner. As soon as the monitor at whose desk the called line terminates answers by inserting a plug of one of her cord circuits into the jack associated with the line, the supervisory lamp of the "A" operators' calling cord circuit is extinguished in a similar manner to that of the answering cord. Upon the plugs at the monitors' desk being withdrawn from both lines on the completion of the calls the two supervisory lamps glow on the "A" position and the operator clears the connections.

Should the calling monitor ask for a number representing a subscriber on a distant exchange, the connection is completed over a junction line to the "B" position as described later.

The connections of the line circuits to the magneto positions are similar to those in Fig. 5 with the exception that the calling lamp L2 is replaced by an indicator of the hand or self-restoring type.

The connections of the incoming order wire junctions are shown in Fig. 6, the working of which is similar to the regular central battery junction circuit, but the connections are somewhat simplified and less apparatus is involved.

The principal reason for this is that it has been found more economical to use extra wires for signalling purposes on account of all the lines being internal.

INCOMING ORDER WIRE JUNCTION FROM "A" POSITIONS.

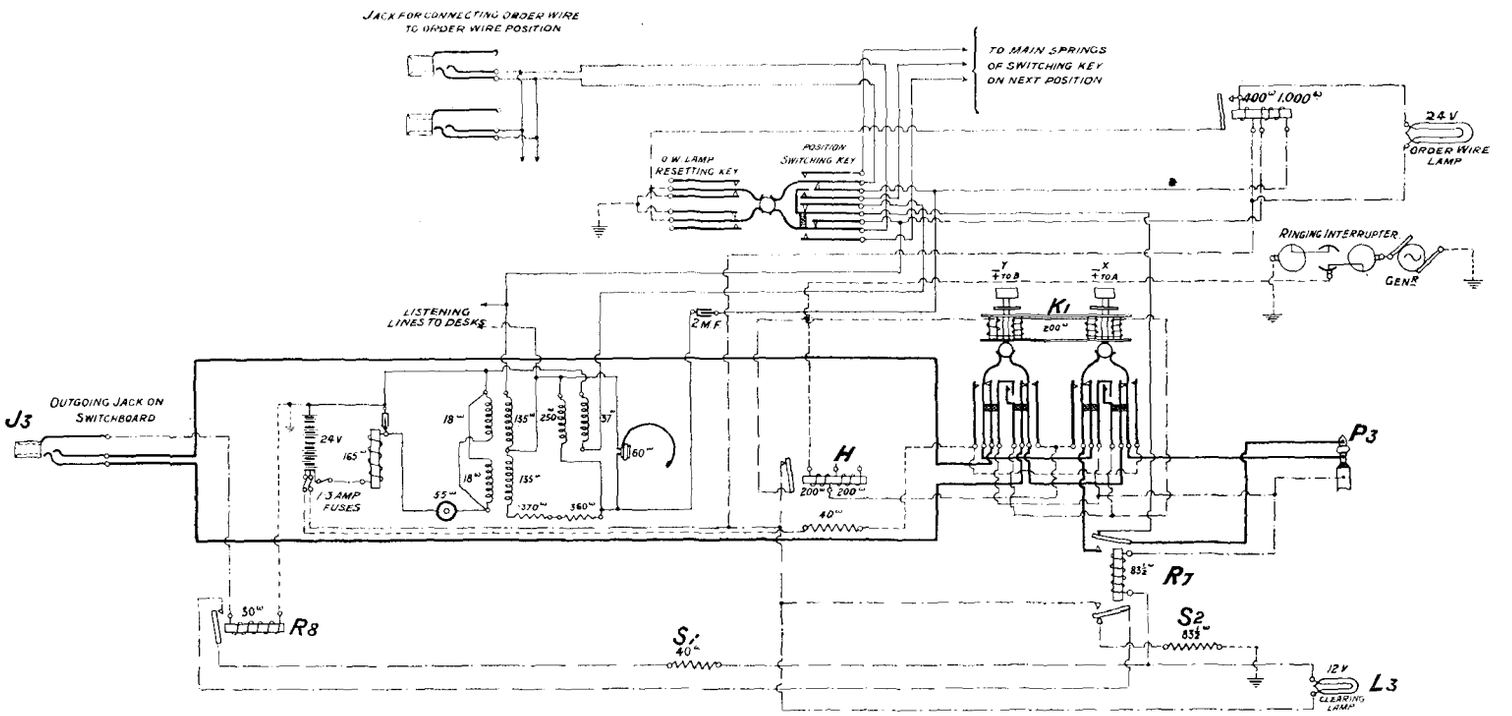


FIG. 6

The operation of these circuits is as follows:—

Requests for connections from the "A" to the "B" operators are passed over the order wire in the usual manner.

The "B" operator, on receipt of a demand for a connection, assigns the junction to be used and then tests by touching the tip of the plug P3 on the bush of the jack of the line wanted to ascertain if engaged. If the line is found to be disengaged the plug is inserted into the jack and one of the two ringing keys depressed. The ringing key used will depend upon whether the number wanted is a direct or party-line circuit. Current then flows through the lamp L3, the 83½ω relay R7 to the sleeve of the plug and thence through the 30ω cut-off relay in connection with the line to which the junction is connected and back to the earthed side of the battery.

Upon the "A" operator inserting the calling plug P2 of her connecting cords (Fig. 4) into the junction jack J3 the 30ω relay R8 is operated and connects the 40ω resistance S1 in shunt with the

clearing lamp L3 which is extinguished. The junction ringing key K1, having been depressed, connects current from the ringing generator to the line through relay H, and causes the calling lamp to light at the calling monitor's desk at which the line terminates. The ringing key, when once depressed, remains in the ringing position until the call is answered as sufficient current does not flow through relay H to operate it owing to the condenser being in series with the calling relay R1; when the calling monitor inserts the plug of one of her cord circuits into the jack associated with the line to answer the call, the relay H, controlling the energising current of the electro-magnetic clutch of the junction ringing key is actuated and causes the ringing key to restore to its normal position, thus completing the circuit, current then flows from the calling monitor's cord circuit and energises the supervisory relay R4 of the "A" operator's cord circuit (Fig. 4) which causes the supervisory lamp associated with that cord to be extinguished.

As soon as the calling monitor withdraws her plug from the line jack the supervisory lamp of the "A" position calling cord lights and the "A" operator (assuming the supervisory lamp on the answering cord is also alight) withdraws the answering plug and the plug P2 from the junction jack J3.

This causes the relay R8 to fall back, breaking the shunt S1 across the clearing lamp L3, which lights and gives the clearing signal to the "B" operator. Upon the "B" operator withdrawing the junction plug the 83½-ohm relay R7 returns to its normal position and the clearing lamp is extinguished.

Should the "A" operator make a connection with the jack J3 before the "B" operator has inserted the plug P3 into the called subscriber's jack, the lamp L3 at the B end will light as its circuit is completed through the operation of the relay R8. In the event of an "A" operator through a mistake plugging into a disengaged junction line, the lighting of the lamp at the B end of the junction plugged into will indicate the error to the "B" operator.

The connections of the ringing circuits are the same as those of the "order wire" with the exception that a listening key is added to each junction line and the "A" operator calls the "B" operator automatically by inserting a plug into the junction jack and the "B" operator takes the request for the connection over the junction line, her instrument being brought into circuit by means of the listening key.

The information monitor's desk is made to represent a typical monitor's position, and it is equipped with the usual lines for enquiries, complaints, and for intercepting inward and outward calls. The connections of the various circuits are the same as those equipped in the Company's latest central battery exchanges.

The clerk-in-charge's desk is provided for the chief school-mistress, and in addition to the usual equipment she has lines to all the operator's head sets.

(To be continued.)

THE CALL OFFICE SITE.

By H. H. THOMSON.

IT is now commonly recognised by most telephone administrations that the public call office is a valuable revenue earner. Time was—and that not so long ago—when in this country, at all events, call offices hardly paid their way. This was unquestionably owing to the use of free passes, and no greater abuse of the telephone service was ever conceived than these. These free passes with unlimited service rates made the service as cheap as water. Even now, however, the charge for the use of a call office makes the public telephone the cheapest of all public services—message and reply for one penny. The public is not slow to recognise this. The ever-increasing number of call offices established by the Company throughout the kingdom proves both their popularity and utility.

I do not think one can lay down any definite lines in the choice of a position for a call office. Post offices and railway stations are excellent positions, but with regard to others, circumstances vary so in different towns that what may be good in Oldham would perhaps be altogether wrong in Bournemouth. There are, however, certain general rules which can be made to fit the varying circumstances.

The first point to be borne in mind is, of course, that the call office has got to pay; and to be able to do this it must be placed in an accessible position and not too near an existing call office. Accessibility is essential and is the crux of the whole matter. To select an undertaker's shop or a shop carrying on an objectionable trade, even if it be in the most desirable spot in the town, reduces the accessibility at once. As I have just said, railway stations to my mind are excellent positions, but here we have to reckon with the ultra-acquisitive railway management, who in some cases really want more than the call office will take. Gold can be bought too dearly, and failing a reasonably fair rental we must look to the immediate surroundings to furnish our requirements.

A restaurant or any refined class of shop is suitable, but I would avoid tobacconists' shops and men's hairdressers' shops, as ladies do not care to be seen entering these. However, too much importance need not be given to this objection, as, with all due deference, ladies are in the minority of call-office users. Due regard must then be had to the hours the shop is open—the longer the better—and if open on Sundays a greater advantage still is obtained. Preference should be given to premises where someone can be found with leisure enough to instruct anyone perhaps making their first telephone call.

Another point to be considered is the temperament of the proprietor of the premises where the call office is to be placed, and this is of more importance than would appear at first sight. It is easy enough for a call-office keeper to reserve the use of the telephone for those whom he considers his best customers and to discourage its use by others. Quite recently I heard of a case of a man wanting to make a call and being refused by a half-tipsy call-office keeper, who untruthfully alleged that the instrument was out of order. Such conduct creates prejudice against the Company, and injures the public also.

The ground floor must be chosen for the position of the instrument, if possible, and proper arrangements made as to lighting the silence cabinet. The display of the sign in a conspicuous position outside the premises is very necessary.

I had intended forming a comparison of the number of call offices in this and each of the leading countries of the world, but I do not feel confident of foreign statistics. Each country has its own method of preparing its figures, and what one may include another may omit. For instance, it appears that Berlin, with 66,000 stations, has only 183 call offices.

At all events we are only concerned with our own sphere of action and there is still a great field for development. The judicious placing of call offices marks the progress of the Company as much as anything, and as far as the call-office keeper is concerned, the presence of a call office in a well-managed shop will go a long way to increase its number of patrons.

HOSPITAL FUND AT GLASGOW.

THE contributions made by the staff of the Glasgow district to the above fund during the past year have just been allocated as shown below.

Upon receipt of his weekly pay each member of the staff contributes a penny to the fund, and the amounts collected during the four years the fund has been in existence are £110, £145, £160 and £180.

	£	s.	d.
Royal Infirmary (with which is associated the Schaw Convalescent Home, Bearsden)	42	10	0
Victoria Infirmary	25	0	0
Western Infirmary (with which is associated the Lady Hozier Lanark Convalescent Home)	25	0	0
Dunoon Convalescent Home	15	0	0
Glasgow Maternity Hospital	7	10	0
St. Andrew's Ambulance Association	7	10	0
Samaritan Hospital	7	10	0
Lenzie Convalescent Home	5	0	0
Consumptive Sanatorium	5	0	0
Sick Children's Hospital	5	0	0
Quarrier's Consumptive Home	5	0	0
Eye Infirmary	5	0	0
Cancer Hospital	5	0	0
Ear Hospital	5	0	0
Sick Nursing	5	0	0
Quarrier's Home	5	0	0
Kilmun Convalescent Home	5	0	0
	£180	0	0

MEASURED RATES *V.* FLAT RATES.

By STANLEY J. GODDARD.

WHEN they had to decide what they should ask the public to pay for the benefits which the wonderful instrument the pioneers of the telephone service were introducing was going to confer on the human race, they were faced with a very considerable difficulty. The first telephone lines erected were what are known as private wires, connecting together different places or premises, and as no operating or other service was supplied, it was only necessary to charge the user a fair rent to cover the telephones, poles, wires, etc., supplied. With the development of the business arose the idea of connecting to a central switchboard, by means of telephone wires, the premises of various subscribers in such a way as to enable them to intercommunicate; and when this became practicable the system of paying an annual rental for the installation was applied in the same way as it had been to private wires.

The Americans were the first to realise that this system of charge (which is known as the "flat rate") was wrong in principle, unfair to the subscriber, and would, as the business developed, be impossible to continue; and as other telephone administrations gradually realise what the telephone business is, they are following the lead set them in the United States, where at the present moment the bulk of the business is on the measured rate. In some parts of Australia measured rates are being introduced this year, whilst in this country there are a large number of telephone areas where a complete tariff of rates on this system is now in force, and there is but little doubt that before long this method of charging for the service will become practically universal.

In considering the principle on which a telephone tariff should be based, it is necessary constantly to bear in mind what it is that the public are asked to pay for. The original conception of the telephone, the poles and the wires, as the basis of charge, has to be modified when the operating and the exchange equipment become important factors in the cost of conducting the service. The greater the amount of operating called for by any subscriber, the greater the amount of cost involved in giving him the service; and as every article of commerce is, or should be, sold on the basis of the cost of producing it, so the telephone service should be sold in relation to the cost of its production, and the only factor obtainable on which to calculate this cost is the "call."

A properly devised measured rate tariff should be based on the principle that a certain sum has to be paid each year by the subscriber to cover the use of the plant provided for him, including maintenance, interest, and depreciation. This charge should be the same for all subscribers to any individual class of service. In addition, the minimum payment should include a limited service of, say, 500 or 600 "calls." When it is contemplated that a larger number of calls will be required, additional "calls" should be contracted for in advance on a graduated scale, so arranged that the cost per "call" decreases in proportion as the number of "calls" contracted for increases. Under such a scale of rates the telephone administration will receive from each subscriber a fixed charge to cover the annual cost of the installation supplied, and the greater the amount of work it is called upon to do for any individual, the larger will be the amount it receives; and the subscriber knowing that the charges are based on the use he makes of the service feels that he is only being asked to make a payment for facilities which have actually been rendered to him.

Under a "flat" rate, each subscriber must pay such an annual sum as will in the aggregate cover the total cost of the service, and leave a balance of profit. It will be readily seen that on such a system the man who only wants to use his telephone a moderate number of times is paying more for the service he gets than the big user; and the latter is getting more in comparison than his payment entitles him to. As a result the small user is charged too much for the service in order that the large user may get it at less than it actually costs to produce. This is a proposition which the large user on a flat rate does not like to acknowledge as a true one, but on careful consideration it will be found to explain the situation exactly; and probably no argument more clearly demonstrates the unfairness of the flat rate. A measured rate does away with this inequality. It is true, that in many cases the amount paid for the service by an individual may be greater than on the flat rate, but a subscriber in such a position is only paying in proportion to the benefits received and it is within his power to reduce his payments, if he sees fit, by restricting his use of the service.

If the telephone service is to be largely developed it must be offered to the public at rates which will meet the needs of all users—that is, the rates must be so designed as to allow them to be adapted to the requirements of every class of citizen. This is a condition that a scientifically devised measured rate fulfils. The small user can either take a direct or party line, and for a moderate annual payment get all the service he requires. As his user gradually increases he is enabled year by year to contract for a larger number of calls, without making any alteration in his contract. When his traffic has assumed such proportions that one line to the exchange is insufficient, he can for a small additional annual charge hire one or more "auxiliary" lines, at the same time getting the benefit of the cheapest rate in respect of the calls sent over them. The low rate at which auxiliary lines can be supplied is not only a benefit to the subscriber who hires them, because it enables him to deal with his traffic cheaply, but is incidentally a great relief to the service, because as the tariff is so low the subscriber has no hesitation in renting as many lines as his traffic may demand, and consequently the "engaged" trouble, as far as he is concerned is done away with. Under the unlimited rate there is a tendency on the part of a subscriber to crowd his lines with traffic, because the annual rental for an additional line is heavy; but where an additional line can be hired at the auxiliary rate this tendency disappears—to the relief of the whole service. When it is realised that 24 per cent. of the calls in a telephone system such as London test "engaged," largely because subscribers have not sufficient lines to accommodate their traffic, some idea may be realised of the benefit to the service which would arise were this difficulty removed only by one-half.

In the process of time "auxiliary" lines become inadequate, and the private branch exchange automatically supersedes them. The rate for this class of installation is so designed that it not only enables the subscriber to buy his calls at the cheapest rate, but the annual rental of each junction circuit to the exchange system is so low that he can well afford to rent a sufficient number of them to ensure against delay either to his outward or inward traffic by reason of his lines being reported "engaged." Another advantage of the private branch exchange, with its attendant extension stations, is that it enables the telephone message to be delivered direct to the individual for whom it is intended without the waste of time which is inevitable if he has to be sent for to come from a distant part of the building to get to the telephone. All telephone users will readily recognise the advantage of communicating with the particular person with whom they want to speak without such a delay; and it will not be long before employers of labour will realise that the annual cost of an additional station or two is nothing in comparison to the cost of the waste of time that must necessarily take place when their employees have to leave their work and perhaps walk some considerable way to attend to a telephone call.

Let us now see what effect the introduction of a measured rate service has on the administration supplying the service. In the first place, as each message has to be paid for by the subscriber making it, the tendency will be to eliminate frivolous messages, as he will be careful to send only those which are necessary, with the result that a smaller number of calls will have to be handled by the operators. Consequently each operator will be enabled to attend to a greater number of subscribers, less exchange plant becomes necessary (with a consequent saving in the capital cost of the exchange equipment and a corresponding saving in rents, rates, lighting, heating, etc.)—and of course a smaller number of junction circuits are wanted. As against this saving there will be the extra expense in recording each call and rendering accounts to the subscribers, but the saving will probably be found to more than compensate for any extra expense which may be incurred.

From the point of view of a telephone administration the whole position is altered when a flat rate of charge is superseded by a measured rate. Whilst under the former there is little

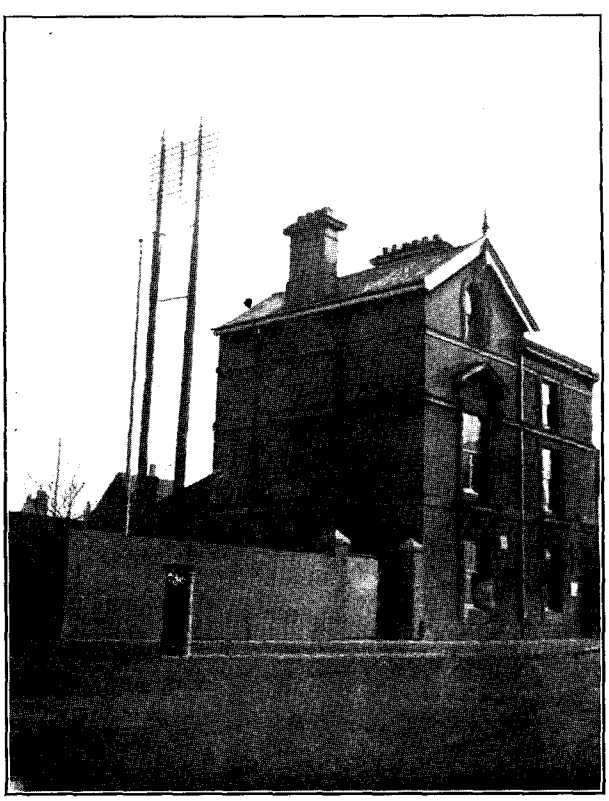
incentive to see that all calls become effective, as no more revenue is received whether calls are put through or not, under the latter system of charge no revenue is received in respect of any particular call until it does become effective, so that it is clearly in the interest of the administration to take care that every call made becomes revenue-earning. This may not seem at first sight to be very important; but when it is considered that to produce this result much greater care is necessary to ensure the subscriber being supplied with an installation which will meet his requirements and prevent delays, and that the exchange equipment must be of the most up-to-date description, it will be realised what a stimulating effect will be produced on the purveyor of the service, and consequently how much the service is likely to be improved by the introduction of a measured rate tariff.

THE NEW COMMON BATTERY EQUIPMENT AT GRIMSBY.

By W. COWBURN, *Grimsby*.

EARLY last year it was decided to remove the Grimsby Exchange to larger premises and a large three-storeyed house, about 100 yards distant from the old exchange, was purchased.

This house had been untenanted for several years previous to its purchase by the Company, and extensive structural alterations



NEW GRIMSBY EXCHANGE BUILDING.

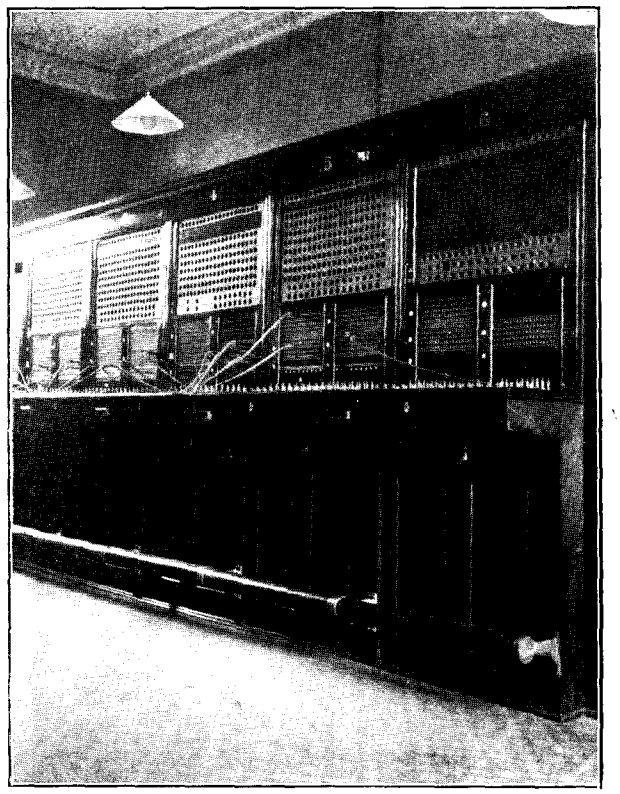
and renovations were necessary to adapt it to the Company's requirements.

A photograph of the premises is shown in Fig. 1. Their situation almost coincides with the ideal telephonic centre

The ground floor is occupied by the general office, call office, power room and line stores, and on the first floor are situated the switchroom, operators' retiring room, local manager's office, inspectors' room and instrument stores. The third floor is used exclusively by the caretaker.

The yard covers approximately 350 square yards.

Owing to the Corporation refusing for a long time to grant underground wayleaves, the lines are all overhead, but arrangements have now been made to put down an underground system, and



NEW GRIMSBY EXCHANGE—NO. 9 SWITCHBOARD.

Grimsby will shortly have a completely up-to-date telephone system.

When it was decided to remove the exchange it was also decided to install common battery equipment at the new premises.

Some of the advantages of such equipment are particularly desirable in central offices in small towns; others are not essential.

The central supply of power, the simple subscribers' apparatus,

NEW GRIMSBY EXCHANGE—TEST CLERK'S DESK

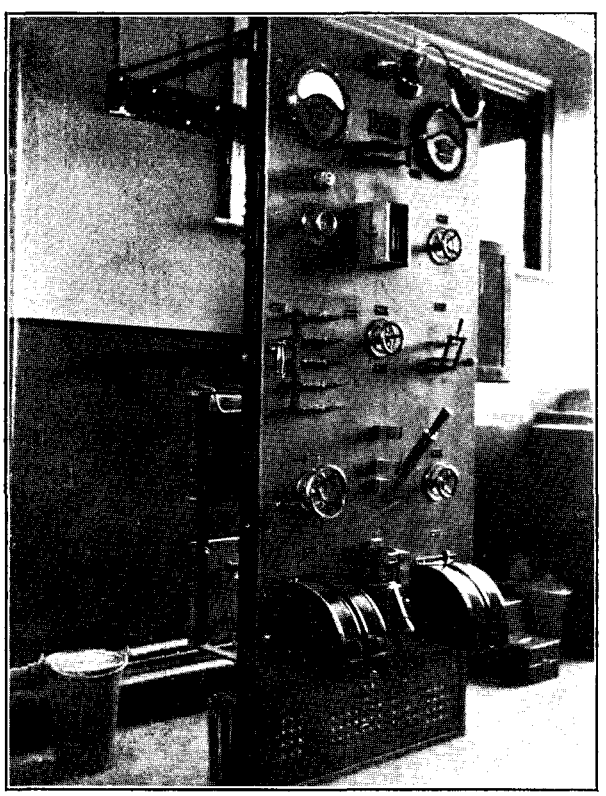
and automatic signalling are important. It is necessary also to be able to add to small switchboards in small units, to keep the current consumption down and to make the circuits and apparatus as simple as possible.

On the other hand, space in the face of the switchboard is not as valuable in a small as in a large board, while answering jacks having line signals associated with them, and positive supervisory signals, are not of vital importance where a small volume of traffic is to be handled.

Probably for some of these reasons it was decided to install a No. 9 equipment, and this is the first of this type of common battery equipment to be brought into use in this country.

The new Grimsby board is now equipped for 700 lines, and the ultimate capacity of it is 800. When this capacity is reached the board will have to be equipped with relays and lamp signals.

The board is built up in six sections; the first is used for junctions, which terminate on ordinary self-restoring indicators. The 700 lines are divided amongst the other five sections.



NEW GRIMSBY EXCHANGE—POWER SWITCHBOARD.

There are no separate answering jacks and the subscribers' lines terminate on what are called "eye-ball" indicators, which are swung downwards when the subscribers call, showing an aluminium hemisphere, which somewhat resembles a sightless eye and forms a distinctive signal. On the operator plugging in to answer, the current is cut off the line indicator (which restores by gravity) and the answering supervisory signal (also of the eye-ball pattern) is actuated. A similar signal is on the calling cord and this is brought down when the called subscriber answers. On conclusion of the conversation, when both subscribers restore their telephones, both supervisory signals are restored.

The condition of the supervisory signals on cords which are not in use and on cords on which both subscribers have restored their telephones is the same, and unless the operator disconnects immediately the signals restore the disconnection is liable to be delayed. This is an objection to negative supervisory signals.

To those accustomed to a lamp board, the noise made by the working of the signals of the No. 9 board would be noticeable, particularly during the busy parts of the day, as the subscribers' indicators are brought down with a smart click. However, there is compensation in the fact that when a subscriber calls there is an audible signal, as well as the pilot lamp, to attract the operator's attention.

The main frame consists, on the horizontal side, of eight shelves, each having capacity for 220 pairs of wires, and on the vertical side of eleven arrestor bars for 100 pairs of wires each; the first of these is used for junctions, order wires, private and other miscellaneous lines.

Two ringing generators are installed, one driven by motor from the Corporation mains, and the other from the 36-volt battery.

The battery consists of one set of sixteen chloride cells in lead boxes mounted in two rows of eight, one above the other. They are large enough to hold ultimately plates of sufficient capacity to give 80 amperes for nine hours without the voltage falling below 1·85 per cell; seventeen plates per cell are installed at present, and these are capable of giving 53 amperes for nine hours.

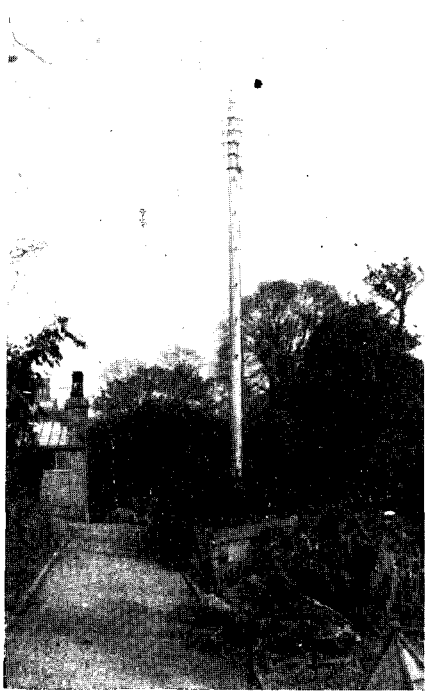
The charging machine is a 40-volt 75 amperes motor driven, shunt wound generator, and is capable of charging the battery and serving the exchange simultaneously without introducing disturbances on the lines. In case of emergency it is suitable for use without the battery.

Chief operators' and test clerks' desks of the latest pattern are provided, and the whole equipment is a model common battery installation on a small scale.

A WAYLEAVE DIFFICULTY AND HOW IT WAS OVERCOME.

IN certain residential and high-class districts of Sheffield it has become increasingly difficult to obtain the necessary permit to erect distributing poles, or, indeed, any kind of pole whatever.

In one or two instances this has been overcome by the erection of distributing



poles without arms. The accompanying illustration will explain more clearly than a long and elaborate description.

In one case a weather vane was fixed instead of the finial shown in the illustration.

Tubular pole brackets and S A 6 bolts were used to distribute the open wires.

SMART CONTRACT WORK.

S. MCNEE, a Wilmington canvasser, while he was waiting to use the telephone, overheard a request for a messenger to be sent. He was able to get the name and address of the party wanted, and had a signed contract for service within one hour. An old suggestion is repeated—follow up the people who are being sent for by messenger. They *cannot* claim they have no use for the telephone.

The same canvasser noticed an account of a robbery in the suburbs of Wilmington. The victim was a man who had emphatically refused to take service. A prompt call that day, however, brought an equally prompt request to install service as quickly as possible. The way to be ready for an emergency of this kind, however, is to have the service installed *before* it is needed, not after the emergency proves the need.—*Telephone News*, Philadelphia.

WHAT ESTIMATE DO GIRL CLERKS FORM OF MEN?

IN pondering over many things, the question as to what girl clerks think of men has often presented itself to my mind. I know that Mr. CROSLAND, the author of *The Unspeakable Scot*, etc., thinks very little of girl clerks in general, and of typists in particular, and says that the lady who can manipulate the typewriter is capable of any crime. But Mr. CROSLAND has a bad opinion of everything, from Sir WALTER SCOTT'S novels to the practice of filling up space in our drawing rooms with books of poetry, and perhaps his opinion should not be taken as that of the average man. However this may be, I do not think that girl clerks have such a strong antipathy to any one class of business men as that evinced by Mr. CROSLAND for the clerks of the opposite sex.

To return to my subject. I should say, first, that the opinion one forms of business men depends to a great extent on the disposition of the girl clerk. If she possesses a large development of the "bump" of love of approbation, and her fellow clerks of the "male persuasion," as ARTEMUS WARD has it, throw in with their business transactions a judicious amount of flattery—and certainly some of them seem to be highly endowed with the gift—the girl clerk will probably entertain a very fair opinion of them, or at least, one supposes, of their judgment. Speaking of which reminds me of a character in ROBERT LOUIS STEVENSON'S *Kidnapped*, ALAN BRECK. So very anxious was this worthy to win the golden opinion of others that he invented the most extraordinary stories merely in order to fall in with the mood of his companion for the time being.

Then, again, there is the unimpressionable species of girl clerk who is somewhat inclined to be bored by flattery. As a rule she will judge those with whom she comes in contact from a very different standpoint. In the first place she bases her opinions on the straightforwardness, consideration, and, it is scarcely necessary to add, on the respect with which a man treats her; she also appreciates the man who displays an appetite for a good joke.

I have heard of the man with the weakness for getting other people to do the fag ends of his work. If taken in the right way, who so suitable and, to all appearances, easy to get round as the girl clerk? What does she think of him? Not much.

The "fatherly" man is not a bad sort to know, especially if she has got into an ugly corner, when he sometimes helps her out. On the whole I am convinced he is a good friend to the girl clerk.

Now I come to that unfortunate creature the shy man. He is, I think, one of the most pitiable objects on the face of the earth. JEROME K. JEROME, in his *Idle Thoughts of an Idle Fellow*, aptly describes him as "A poor, gasping, blushing creature, with trembling hands and twitching knees." And what does the girl clerk say of him? I am disposed to think that she holds pretty much the same opinion of him as other people do, namely, she does not understand him and leaves him alone. A great many clever men are shy—why, I cannot conceive—and it is a curious fact that some of the cleverest of them are as often, or oftener, stuck for a word or remark as the greatest blockhead among us. He is not met with so often in business as in society. The reason is not hard to find, being simply that it is easier to feel at home at one's daily work than when one has nothing in particular to do. Personally I have a kind of fellow-feeling with shy people. I think they suffer a good deal and get little but ridicule.

Another more amusing species of our tribe is the absent-minded man. We do not meet him much in business. He is usually of a studious turn of mind; and I can picture him leisurely walking along a country road on a summer afternoon with a book in his hand, his eyes, blind to all that lies around him, gazing vacantly into space, his mind busy with the deeds of the heroes of bygone ages. Perhaps it is as well for himself that he devotes his time to the pursuit of learning rather than to the rush and hurry of an office. I am afraid the girl clerk would take advantage of his absentmindedness, and I do not think she would like him (though I do not speak for myself), at all events, not if the disease had gone so far as it had in a certain learned gentleman who, sitting on a rustic seat with a young lady, gently took her little finger to scrape the tobacco out of his pipe. Now who would like to be treated like that?

I should now like for a moment to touch on the fussy man. Speaking as a girl clerk I give it as my opinion that the fussy man is responsible for a great deal of lost temper on the part of his fellow-workers—temper which might be saved for a more worthy object. He is for ever tearing about like a whirlwind, and is a bore to everyone including even himself; and the worst of it is that we can lay our hand on no single point on which to "go for him."

The idle man is fast disappearing. We used to read of clerks—usually well-to-do young gentlemen, articled to the legal profession—kicking their heels against their stools and yawning for closing time. The only thing they seem to have given their earnest attention to was the playing of practical jokes, and their studies in this direction were pursued with great avidity and praiseworthy determination. They are extremely interesting to read about, but where are they now? The twentieth century has no room for idle people. I don't know exactly what the girl clerk thinks of the idle man, but I suspect she does not object to him very strongly provided he does not try to shove any of his work on to her.

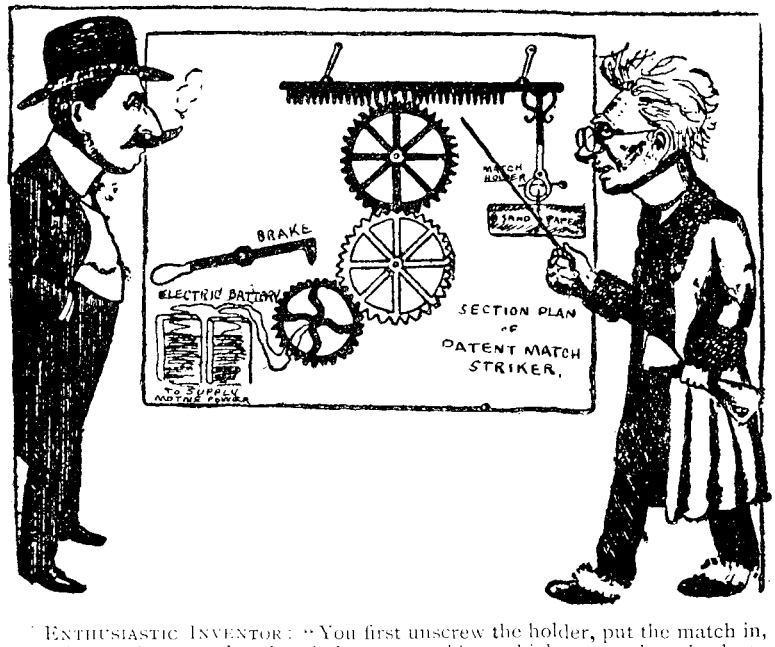
I might say in conclusion that the question of sex should not be taken into consideration in business life. Provided the work is satisfactorily done, what matters it whether it be performed by a male or female clerk. Let efficiency alone be the test.

A TELEPHONE MIX.

"ARE you there?"
"Yes."
"Who are you, please?"
"Watt."
"What's your name, please."
"Watt's my name."
"Yes, what is your name?"
"I say my name is Watt."
"Oh! Well I'm coming round to see you this afternoon."
"All right. Are you Jones?"
"No; I'm Knott"
"Who are you then, please?"
"I'm Knott."
"Will you tell me your name, please?"
"I'm Will Knott."
"Why won't you?"
"I say my name is William Knott."
"Oh, I beg your pardon."
"Then you'll be in this afternoon if I come round, Watt?"
"Certainly, Knott."

They were then "rung off" by the exchange, and now what Knott wants to know is whether Watt will be in or not.

A WARNING TO INVENTORS.



ENTHUSIASTIC INVENTOR: "You first unscrew the holder, put the match in, screw it up, then set the electric battery working, which causes the wheels to revolve; these cause the top bar to move along, thus dragging the match over the sandpaper and igniting it. Then you apply the brake, stop the machine, unscrew the holder and you have your match struck for you."—*Sydney Bulletin.*

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"BY THE STAFF FOR THE STAFF."

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LAST YEAR'S WORK.

THE NATIONAL TELEPHONE COMPANY'S system had a net increase of 45,323 stations during the year 1906, bringing the total stations in service at Jan. 1, 1907, to 407,736. At the same date there were about 7,000 stations under contract but not yet connected up. Statistics for other European countries are not available until later in the year, but from the statistics of last year and the known rate of increase in the various continental countries, it may be said that the National system far exceeds in number of telephones working that of any other European country except the German Empire, which has a nearly identical ratio of telephone development. The net increase in London was 10,424 stations, bringing the National London system up to 91,619 stations. The Post Office London system now numbers some 38,500 stations, so the combined London system now serves over 130,000 telephones. London therefore has by far the largest city telephone system in Europe, and has more telephones than any European *country*, except Germany and France, though the difference between the total telephones in France and the total in London is very small. Even so, the progress of the telephone in London, both as regards scope and efficiency, is nothing like what it might be if the National Telephone Company had what every other city telephone administration in the world enjoys—the right itself to put down underground work. The powers that be have always refused this facility, to the detriment both of the Company and of the telephone-using public.

That in spite of all difficulties, and in no country have so many and such varied handicaps been imposed on the telephone business as in this, the telephone development here is relatively superior a few further figures will show. The Glasgow National system had 29,908 telephone stations at the end of 1906, which puts the Clyde city ahead in telephone development of all European capitals except Berlin, Paris and Stockholm, and ahead of several European countries, such as Belgium, Hungary and Spain. Italy, with 33 millions of population, has only about 2,000 more telephones than the Glasgow National system. Liverpool has 24,405 telephones, and Manchester 18,795. Liverpool stands about equal in telephone development with Vienna, which has more than twice Liverpool's population. Liverpool and Manchester together have more telephones than Belgium, Denmark, Holland, Hungary, Italy, Norway or Spain. Some of these facts may be of interest to those who occasionally tell the world at large that this country is behind the rest of Europe in the use of the telephone.

Ninety new National exchanges have been brought into service during the year just gone, bringing the total up to 1,285, and 1,215 new public stations, or "call offices," have been opened, bringing the total up to 6,740. New common battery equipment has been installed at eleven exchanges in London and the provinces, with an aggregate capacity of 19,020 lines, and 17,046 subscribers' instruments have been changed from magneto to common battery, while not yet completed but in various stages of construction there are sixteen other common battery equipments, with an aggregate capacity of nearly 35,000 lines. In a still earlier stage in the process of reconstruction and development there are thirteen special telephone buildings in hand for new exchanges or for the extension of existing exchanges.

A gratifying feature of the progress of the past year is the gradual development of private branch exchange service, which is slowly finding acceptance both in regular business and in hotel circles. Both business men and hotel managers have been so long accustomed to get the telephone service for next to nothing that immense difficulty is experienced in convincing them that the superior facilities of complete intercommunication and instant availability of the exchange service at any point in a large establishment are worth the extra cost. But headway is being made steadily, and there is now a fair sprinkling of hotels and large business concerns having modern branch exchange equipments. One satisfactory point is that every user of a branch exchange, after a short experience, is always willing to testify to the great improvement in the service and in the facilities for handling a large telephone traffic. An interesting branch exchange contract made during the year is for an installation on the new Cunard express steamship *Lusitania*. This superb vessel will be the first Atlantic liner to be equipped with a branch telephone exchange adapted to make the city and long-distance service available from the ship when in port. That such a novel and useful facility will be appreciated by many Atlantic passengers there can be little doubt.

WIRELESS TELEPHONY.

THE telephone has for a long time past played a useful part in wireless telegraphy, owing to its great sensitiveness as a receiver or sounder. Now there seems to be a fair prospect of the telephone being used "wirelessly" for its proper function of speech transmission. Scientific experiments in wireless telephony, not counting those depending on induction and on conduction through the earth, have been made for a long time past, as some twenty years ago Professor GRAHAM BELL showed that it was possible to talk along a ray of light. At first the "radiophone," as Professor BELL named the apparatus used in this beautiful experiment, depended for its action on the selenium cell. Further experiments were made in

America, employing a searchlight to furnish the beam and putting a specially constructed telephone transmitter in circuit with the arc, the receiver consisting simply of a tiny glass chamber containing a substance which readily contracted and expanded in response to the variations in the heat transmitted by the beam. With this apparatus it was possible, under favourable conditions, to talk over a distance of something under a mile. Dr. RUHMER, of Berlin, made further experiments along the same lines, and succeeded a year or so ago in increasing the distance to several miles.

The radiophonic method of wireless telephony is of great scientific interest, but contains little promise of being of commercial value. But now comes the Poulsen development of the Duddell singing arc, and, with the ability to discharge into the ether a continuous stream of undamped electric waves at the rate of a million or so a second, promises a practicable method of wireless telephony. In fact there has already been a certain amount of performance, as reports in the technical press describe actual experiments in speech transmission by the new method, made in December last between Berlin and Nauen, a distance of 25 miles. The transmission was one way only, as one station was equipped for receiving only, not for transmitting. The Berlin correspondent of *The Times Engineering Supplement* gives the following account of the experiments, which were witnessed by Professor SLABY and by Mr. SYDOW, Under-Secretary of State for the Imperial Post Office:

> "The flame arcs employed were formed between a row of electrodes, which were cooled by means of water, and towards these arcs the vibrations of the microphone circuit were then directed. The microphone employed was a so-called 'stentor-microphone,' made by Messrs. Mix & Genest, and the instrument was enclosed in a pasteboard speaking-trumpet. As a check on the accuracy of the signals an ordinary telephone wire was employed which was laid between the station at Nauen and the Berlin office of the company, and this was connected with an instrument in an adjoining room. After the attention of the Nauen operator had been secured by striking with a rod of metal on the metal mounting of the microphone, beginning with the customary 'Halloo!' a series of numbers were called out into the microphone. At first single numbers, such as 1, 7, 9, 10, were used. These numbers repeated several times into the speaking-trumpet attached to the microphone, and then by an adjournment to the next room it was possible to receive by means of the ordinary telephone the numbers called back from Nauen. Next, sets of figures were selected, and these speedily came back correctly by ordinary telephone message. There were occasional interferences or interruptions which caused the suppression of whole groups of figures, but when these were repeated correct results were obtained. Subsequently tests were made by calling numbers and letters, both single and in groups, as also consonants and vowels, and, lastly, the attempt was made to transmit an entire sentence, and this was, on the whole, intelligibly and correctly conveyed. Mr. SYDOW is of opinion that the possibility of transmitting speech to great distances without the aid of wires has been practically demonstrated by these experiments."

Mr. SYDOW's opinion will doubtless be generally shared, but from the nature of the case the commercial development of wireless telephony by this method will be even a more difficult task than the commercial development of wireless telegraphy has proved to be. For normal business purposes wireless telegraphy, in spite of its already highly developed practical state, has made absolutely no impression on the established system of wire and cable communication. In telegraphy the electrical part of the communication is done between a relatively small number of fixed points, the collection and distribution of the messages being done in detail by hand. In telephony the entire service is electrical, and the fixed points between which communication is required are in hundreds of thousands and in millions. These conditions will necessarily limit the practical application of wireless telephony. In naval work and in ship to shore communication wireless telephony will be enormously valuable and will probably quickly displace wireless telegraphy.

MORE ABOUT ENTHUSIASM.

THE remarks about the relative enthusiasm of American and English telephone workers have, we are glad to say, called forth a certain amount of comment, and we print one or two letters bearing on the subject. One correspondent points out, what has already been pretty strongly urged, that enthusiasm, that is the right and useful kind of enthusiasm, is necessarily based upon knowledge. Many telephone men, says this correspondent, do not even know how the service is worked and have never been inside an exchange. We can hardly believe that this charge would lie against a large proportion of the staff who have to deal with the public, but certain it is that a clear working knowledge of the principal features of the service is not universal, as it should be, and many important details regarding rates, classes of service, number of stations working, and so on, *data* which every man who meets the public should have at his fingers' ends, are too often not really known but merely guessed at as occasion arises. This is not as it should be. Knowledge of this kind is necessary for the proper conduct of the business, and unless it is acquired a man cannot do justice to himself or to his work. Certainly he cannot have much enthusiasm if he is content to ignore even the simplest and most necessary facts regarding the business he represents.

Some think there is as much enthusiasm in English as in American telephone circles, but they base this opinion on the fact that every one of us can point to one or two who are real enthusiasts, who want to know everything that there is to be known about the telephone business, and, like Oliver Twist, are always asking for "more." Quite true. In every locality we have our enthusiasts—GOD bless them! But we have not the general and pervading enthusiasm, especially in the circles where it is so much needed. One or two examples of the scale of business to which American telephone enthusiasm and thoroughness conduce may be quoted. The Philadelphia *Telephone News* recently published a "roll of honour," showing the names of members of the contract department who had secured £200 *worth of new business during the month*. In one list, and that for September, a slack month, we find 33 names, and the first man secured £621 of new revenue! In the busy months of the year there were more than twice the number of names, and the leading man ran up to nearly £800 of new revenue. Sometimes the number of new stations is used as the basis of the "roll of honour," 60 new stations in the month being the *minimum* to gain admittance. In January, 1906, taking that month at haphazard, there were 20 names on the list, and four out of the twenty had each secured *over* 100 *new stations in the month*, the top figure being 115. American prices are high, and favour large totals. The American public takes the telephone at its face value, which favours rapid development. But even making due allowance for these factors, the figures quoted show that there is something in enthusiasm.

SOUTHAMPTON EXCHANGE.

This exchange is fitted with a switchboard of a capacity for 4,600 lines, of which at present 1,300 lines are in use serving 1,610 stations. Including authorised additions there are 37 junction circuits to the Southampton Post Office, an important trunk centre for the distribution of trunk service to Portsmouth, Bournemouth, Isle of Wight, etc. The cubic capacity of the switchroom is 63,232 cubic feet, of which the illustration depicts only about one-third.

"HUSTLE" IN ANSWERING TELEPHONE CALLS.

By A. C. GODFREY, *Liverpool.*

WE are all familiar with the usual introductory remarks that take place when two persons are put into communication with each other by telephone. Something after this style:

"Are you there?"
"Yes!"
"Who are you?"
"Jones Bros! Who are you?"
"Smith & Co! Is Mr. Jones there?"
"Yes! Do you want him?"
"Yes! Please ask him to speak," and, unfortunately, the average subscriber is not the only one who wastes time in this way, as the same method is followed by the majority of the Company's staff, I am afraid. In these days of "hustle" life is too short to *waste* time on the telephone. What the telephone is installed for is the *saving* of time, and anything that will enable us to get to "business" right away when telephone conversations are necessary is a step in the right direction.

For some time past in Liverpool we have tried, with great success, the American method, which was introduced by the district manager, and is very simple; where there is a big intercommunication system as well it is a time saver on a large scale. On the bell ringing for an exchange call the official answering states straight away the name of his department, thus

"Contract department, Telephone Company,"
"Chief electrician, ,, ,, ,,"
"District office ,, ,, ,,"

and so enables the person at the other end to know at once with whom he is in conversation.

In the case of an intercommunication call the procedure is very similar, except that "Telephone Company" is not necessary, and in the case of heads of departments they usually give their names straight away.

If subscribers could be educated into this way of answering calls a general saving of time would be effected and the service would be worked much more smoothly for all concerned.

PREPARATIONS FOR CHANGING FROM MAGNETO TO COMMON BATTERY WORKING.

By J. B. SALMON.

WHILE there have been several very interesting articles on these changes in the JOURNAL, the writers have only lightly touched on the necessary preparatory work.

It therefore occurred to me that the experience gained in assisting to prepare a magneto system of about 700 lines for changing over to common battery working would be interesting to readers of the JOURNAL.

First and foremost, was the laying down the necessary cable and reconstruction of overhead work, as the exchange wires were all working overhead and most of them were earth circuit.

This part of the work will be familiar enough to engineering readers and need not be enlarged on. Much of the overhead work in existing large exchanges having underground plant will, in my opinion, require overhauling, long spans shortening, extra staying, country lines overhauling and tree cutting done before such plants are fit for common battery working. The common battery system will not submit to engineering indignities!

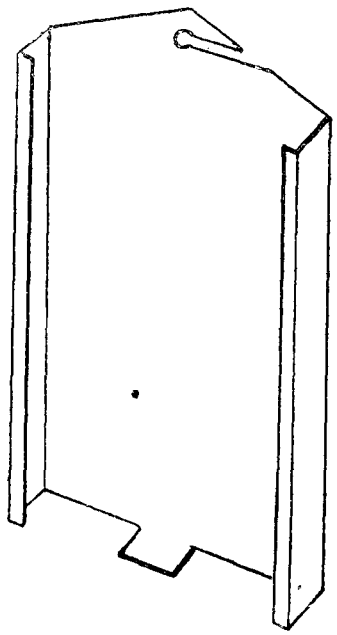

FIG. 1.

While this work was going on in the case under discussion, condensers were being fitted in all the bell circuits of magneto subscribers, and later in the bell circuits of "*x*" party line subscribers, and on these 1,000-ohm impedance coils were fitted at the exchange, one coil being joined from the *x* leg of each party line to earth. These were fitted in the testboard on the switchboard side of the test jack so as not to interfere with insulation tests.

The above work calls for good organisation, otherwise much time is wasted. The plan adopted was to deal with the subscribers' instruments by areas.

It was found best as usual to have a short length of office wire soldered to each condenser in the stores, owing to the lack of facilities for soldering at subscribers' premises.

In my opinion, these condensers, in the case of wall instruments, are best suspended from the bottom fixing screw of the instrument, with the top of the condenser behind the projecting piece of the back board. This can be done by means of wire slings or by a condenser holder made of thin sheet iron as per sketch (Fig. 1). The advantage of this arrangement is that the connections are out of the way of meddlesome fingers, that no stapling or nailing up is needed, and that standard lengths of office wire can be used without waste.

Damp walls should be avoided, as the insulation of a condenser is liable to break down when the condenser is exposed to damp. Skirting boards should not be used for the purpose either, owing to risk of damage to condenser. In one case where condensers had been fixed to skirting boards it was found that the subscriber had tacked his carpet on to the condensers!

Special care should be given to the work of fitting condensers in switchboard circuits at subscribers' premises and sub-exchanges, and only experienced, light-fingered men should be allowed to do the work, otherwise good wiring and apparatus may be spoilt.

Insulation tests were systematically carried out on all lines from one of the switchboard multiples (this being quicker than using the testboard) and all lines having a lower insulation than the Head Office minimum of 60,000 ohms were overhauled. As a matter of fact nothing less than 500,000 ohms was passed, I believe, as it was found this could easily be obtained. The insulation faults were usually found after or during rain.

The testing for polarity of receivers was done in conjunction with the condenser fitting. A 40-volt battery was fitted up in the testroom in series with the secondary circuit of an instrument, a reversing key, and a test plug. The normal position of the key being arranged to give positive and earth on the tip or "A" line. The fitting inspector then got the test clerk to plug this arrangement on the line being tested and saw that the receiver was connected up so that the higher speaking efficiency was obtained with reversing key at normal. It was found that the ordinary 24-volt battery did not produce sufficient effect on a double pole receiver to enable an inspector to tell with certainty the right and wrong polarity.

It is advisable to run through this test just before the change

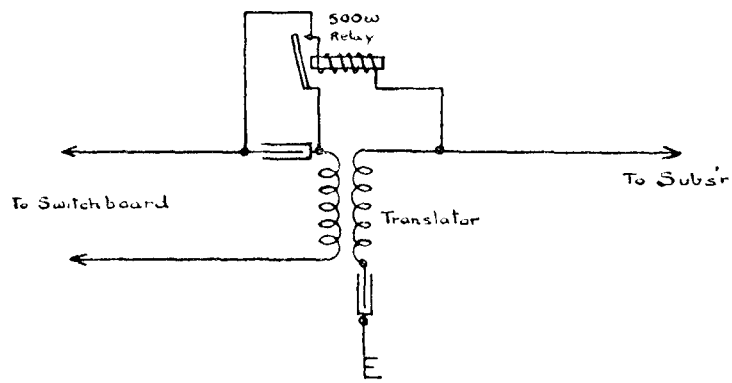

FIG. 2.

over, as it will probably be found that some subscribers have reversed their hand microphone plugs again, because "the man left it the wrong way round!"

One earth circuit subscriber's line could not be metallic circuited owing to it running on a Post Office route, and the circuit shown in Fig. 2 was made up for his line, the magneto instrument and local battery being retained at his end with a condenser in the bell circuit as usual.

Contractors carried out the necessary switchboard work, but all the switchboard circuits, etc, were tested with the standard test box before the plant was taken over by the Company. An important item was to make sure that the Post Office had a few junctions ready for working on the new system.

The actual change over was effected by inserting microscope glasses between the cut-out relay contacts, as described in Mr. GREENHAM'S article in the January JOURNAL, a Head Office official superintending the change over. Head Office expressed themselves very satisfied with the change over, only a small percentage of faults appearing after the transfer of the service to the new board.

THE TELEPHONE AGAIN.

JUST before five o'clock on Jan. 17, much alarm was caused in the Barafield (a fashionable locality in Exeter) by an outbreak of fire at Dr. Heyman Wreford's residence, a large detached brick-built house. The house being connected to the local exchange, the fire brigade were promptly summoned by telephone. The superintendent was quickly on the scene with men and apparatus, and little damage was done, owing to the judicious use of the telephone and the smart work of the fire brigade.

A NOVEL UNDERGROUND JOB.

LOWERING PIPES AND CABLES AT BAKERS HILL, SHEFFIELD.

By F. Barr.

It may prove of sufficient interest to many of the readers of the JOURNAL to see a few views of a job that fortunately is not common in the daily routine of a telephone engineer. Owing to a radical alteration in the level of a street it became necessary to lower an underground route to a considerable depth.

The preliminaries having been settled between the Corporation and ourselves, steps were at once taken to ascertain the alterations of levels required by the Corporation to meet their proposed street improvements. Fig. 1 will make this clear better than a lengthy explanation.

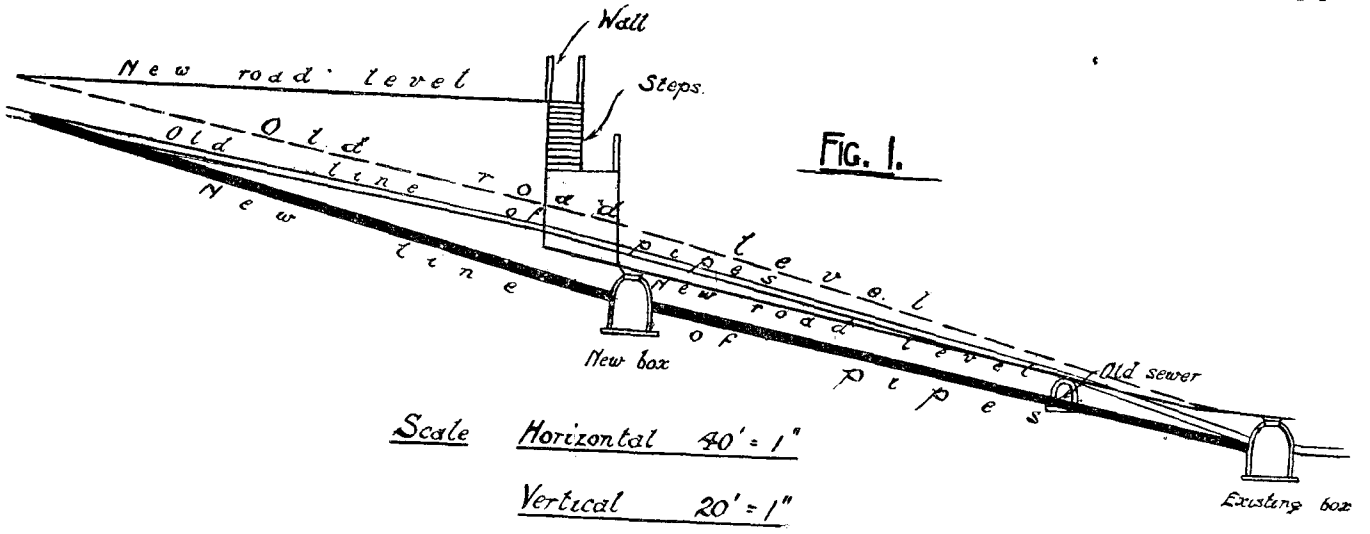

FIG. 1.

The pipes were then bared as shown in Fig. 2. It will be noticed from this view that three different lines of pipes were affected. On the extreme right are those of the Company's, consisting of nine pipes, in three tiers of three, containing seven cables. The other two sets are the property of the Corporation Electric Light Department and consist of 4-in., 3-in. and 2-in. pipes to a total of 29.

After baring the pipes the sides of the trench were timbered up to prevent the sides caving in and to allow of the pipes being supported whilst the ground was excavated under them. Fig. 3 shows this operation.

The whole bed of pipes was supported by heavy chains until the required depth was attained. The lowest tier of pipes was then taken in hand and each pipe was separately supported by loops of No. 8 wire, a chain being passed under the remaining pipes to permit of the first one being removed.

Sufficient men were placed along the entire trench and at a given signal each pipe was gently lowered into its new position. The joints were gone over with the caulking iron and the ground was then filled between the pipes, and the next tier operated upon in a similar manner.

In the case of the telephone pipes, a greater length was required

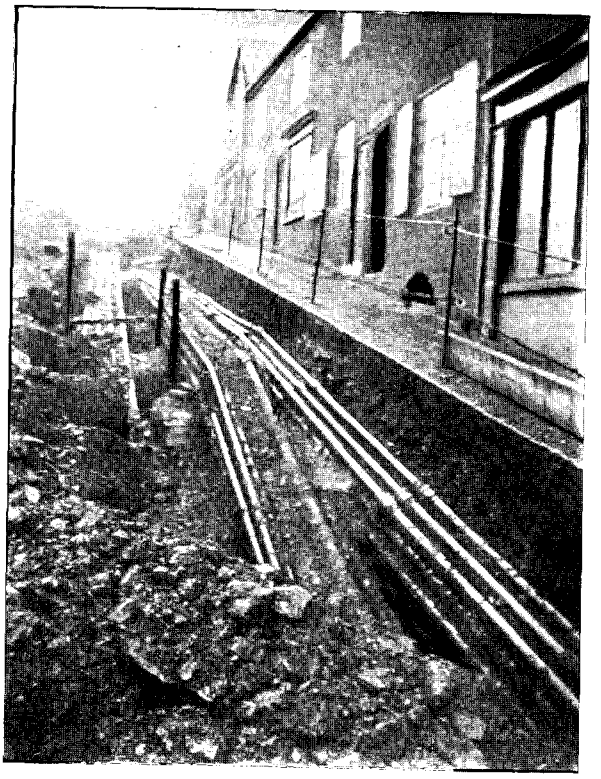

FIG. 2.—DUCTS EXPOSED.

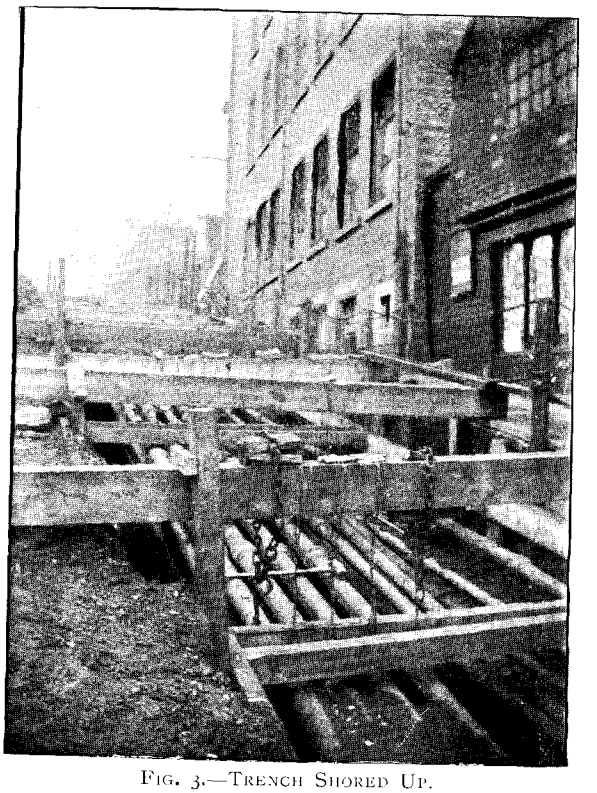

FIG. 3.—TRENCH SHORED UP.

to be lowered, and a steeper gradient had to be dealt with than in the case of the electric light pipes. This necessitated the pipes being cut, and a manhole being built to prevent an awkward dip in the alignment of the ducts. Sufficient pipe only was cut away to

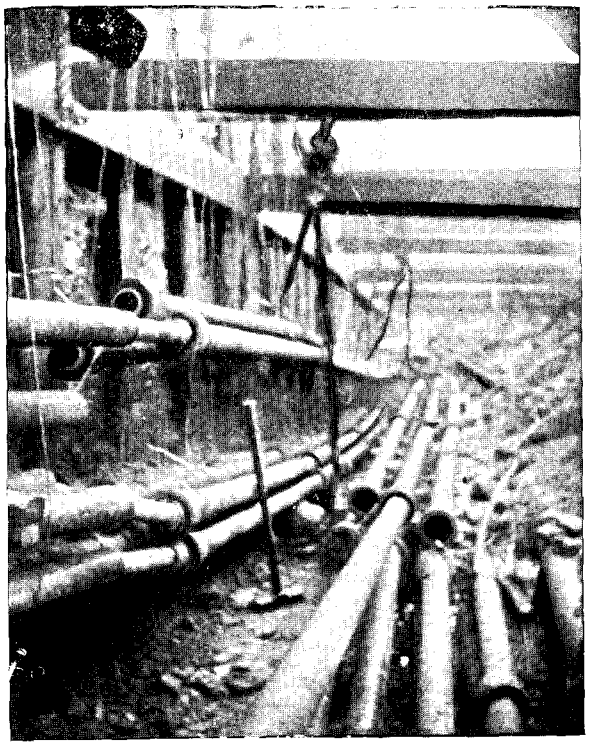

FIG. 4.—DUCTS PARTLY IN NEW POSITION.

prevents the cables from being damaged in the event of any strain taking place during lowering. The stretching, however, amounted to 1 inch only. Fig. 4 shows the pipes cut and one-half of the entire length of the lower tiers resting in their new position.

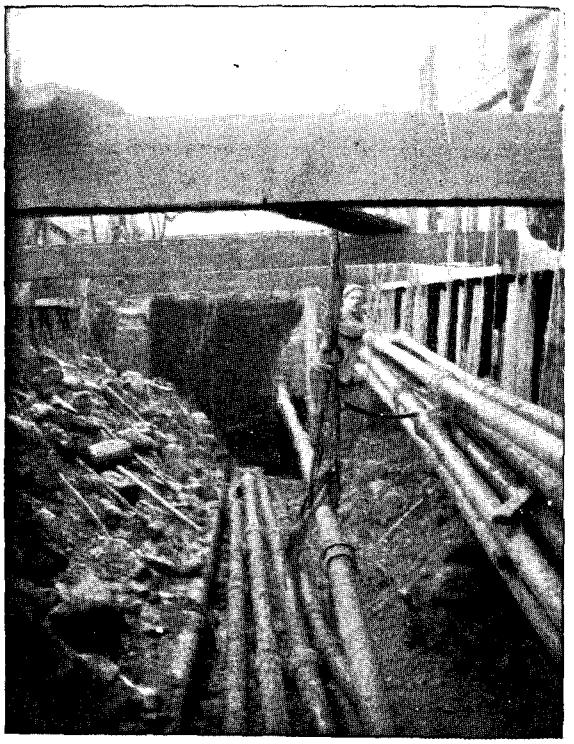

FIG. 5.—DUCTS ALL IN NEW POSITION.

The remainder of the pipe length was lowered after an obstruction revealed by the new excavation in the route of the bed of pipes had been removed.

Fig. 5 shows the side of the electric light manhole removed and our own pipes rising gradually at one side of it. The whole operation was carried out without a hitch.

The work occupied 24 days, the number of men employed varying from two to ten. The length of time occupied and the variation in the number of men was due to the electric light pipes having to be lowered in various places first to permit access to the Company's pipes. Several wet days also interfered with and delayed the work.

REMODELLING A POWER PLANT.

BY A. R. PULFORD, *Chief Inspector, Belfast.*

CONSIDERABLE alterations in the power plant in the Central Exchange at Belfast have just been completed, and a few notes on the operations in connection therewith may prove of interest to those who are contemplating similar works, particularly as the growth of the Company's business naturally necessitates provision for possible requirements under new conditions. This article is written with a view of emphasising the truth of the adage that "the schemes of mice and men gang aft agley," and to illustrate a few of the pitfalls which *will* occur, and the methods adopted for overcoming them. The original plant consisted of a $2\frac{1}{2}$-horse-power motor generator of the one field and two-armature type, driven from the town supply at 220 volts, output 55 amperes at 32 volts, and two sets of twelve E.P.S. L23 accumulators in glass tanks fitted on a wooden rack in two tiers. The cells were placed in a small room off the testroom and the machinery room, for want of a better place, was made by flooring a cable shaft, and had an area of about six feet square, which also provided accommodation for two $\frac{1}{6}$-horse-power Crocker-Wheeler motors driving four large ringing generators of the Ericsson type. It will thus readily be seen that the space was not very extravagant, in fact there was not room in which to swing the proverbial cat.

Owing to the battery room being required for enlarging the testroom, the Engineer-in-Chief, after a personal examination, decided that the proper thing to do was to convert a cellar in the basement of the building into a power room, to transfer the existing plant thereto, and to provide an additional motor generator and set of twelve chloride cells, one set of the E.P.S. cells to be made up of the best cells of the two old sets, which had been in use about six years. Two ringing dynamotors were also provided to replace the smaller Crocker-Wheeler motors and ringing generators, the belt driving of which had been a source of considerable trouble when working with automatic starting. The whole of the apparatus was to be controlled from a new power board, fitted with the usual starting switches and controlling rheostats, voltmeters, and ammeters for indicating the input and output of the plant; this was designed to meet the ultimate requirements of the switchroom, which has capacity for about 5,500 subscribers' lines. The old power board with change-over switch was fixed in a panel in the wall of the switchroom, and was within ten feet of the machines; it was decided to remove the change-over switch to the new power room, leaving the transmitter and service fuse panels in their existing position; this necessitated cutting the marble panel right across to enable the lower half carrying the change-over switch to be removed. It will thus be realised that the work was of considerable magnitude, and required a deal of careful planning so that the service should not be interrupted.

The work was begun on a Sunday at 9 a.m., and was carried out under the supervision of the chief inspector; the most suitable men for the different operations had been instructed in their duties, and in the order of carrying them out, so that each one knew exactly what he had to do and when to do it. Previous to beginning operations the new power board was erected and the cables run to the chloride cells and to the position to be occupied by the set of old ones to be transferred from old battery room, which by the way was situated on the first floor of the building and at the opposite end from the new power room. The old power board was drilled with a series of $\frac{1}{4}$-inch holes by a marble mason and a saw-cut run through, detaching the upper from the lower half. The chloride cells were fully charged a week prior to the change and their reliability proved, and the two old sets were

also fully charged the previous night. New transmitter leads, ringing leads and other circuits were run, tested out, and labelled, and all being in readiness the transfer was begun as already stated, and was completed by 7.30 a.m. on the following morning. There was not a hitch so far as the service was concerned, but the difficulties met with are I think worthy of note.

In the first place, the mason in drilling the marble had cut the holes in an upward direction, consequently when we tried to draw out the lower half the upper front edge of the saw-cut jammed the lower back edge, and we had to cut away about two inches of brickwork below to free the slab; this meant a delay of an hour and half, a considerable item under the circumstances.

The old cells had, as already stated, been in use for six years, and it having been decided to utilise as many as would make a new set of twelve, the question of saving the acid in a clean condition was of importance. Owing to the deposit of sediment in the bottom of the glass tanks, the acid was drained off by means of a syphon consisting of a length of ¾-inch rubber tube, a small draw vice being used as a stopper at either end. With this arrangement a cell was drained off in about two minutes and the sediment left behind; the clean acid was stored in spare carboys and put into the cells by the same method, the operation taking about half an hour for the twelve cells. Each glass tank was thoroughly examined and washed with a hose-pipe as were also the negative and positive plates, new positives being fitted were necessary, and also new separators. The cells were all transferred and renewed and the machine running on them by two o'clock on the Monday morning; this work included cutting and transferring the rack and fixing it in position and carrying each cell a distance of about 50 yards down two flights of stairs. The change-over was made immediately the charging of the renewed cells was put in hand, and this threw out of use the old motor generator, which had been running direct on the 24-volt circuits, and the remainder of the cells which had been taking the 4-volt load and transmitters during the change.

The pitfalls mentioned in the opening paragraph are as under.

Owing to an accident to one of the spare carboys it became necessary to find something in which to store the acid, which of course is not a very nice article to put into receptacles in ordinary daily use; as a last resource an empty tar barrel fulfilled the purpose admirably, although it was with considerable misgivings that its use was decided on.

On the first day 4-volt restoring circuits were reported weak, and investigation revealed that in the hurry of the work, the parallel bus bar connections had been omitted from the power board, which left two cells doing all the work.

On joining up the old motor generator in its new position after a trial run, it was found that the new machine had become reversed, a most extraordinary thing, seeing that the same machine had charged the chloride cells. The solution of this was found to be that the main switch had been inadvertently left in and the machine run from the other one as a motor, thus reversing the field magnets. A short run on the charging circuit remedied this, the alternative being to remagnetise the field from the cells in the reverse direction; this, however, was found unnecessary, probably owing to the mistake being discovered before the field magnets became saturated.

The plant now consists of one 3½-horse-power motor generator direct coupled to a dynamo having an output of 100 amperes at 30 volts for charging the chloride cells, and one 2-horse-power motor-generator already described for charging the E.P.S. cells, provision being made for running either machine on either set as required. One power board with automatic reverse current cut-out, main switches for motors and charging circuits, voltmeter with switch for reading voltage of each separate cell, voltmeter for charging machines controlled by a switch to enable it to work on either, and ammeter for indicating the charge and discharge on all circuits. These instruments are of the Stanley-D'Arsonval dead-beat type. One ten-pole double change-over switch for altering at one operation either set of cells from series to parallel for service purposes. Two ringing dynamotors controlled from switchroom to enable caretaker to change from fixed drive to automatic starting at 8 p.m. each evening. One cog-gear driven air-compressor and desiccator.

All the machines are mounted on white glazed brick beds and the floor is covered with a red tiling with black border; the walls are painted light green with dark green dado and black line. The battery room is just off the power room, being really a part of it, divided by a brick partition, and is treated in the same decorative fashion, with the exception of the floor, which is not tiled.

The whole department is very complete and is a show place next in importance to the switchroom; to anyone acquainted with the old installation the change is nothing short of remarkable.

WORKING LATE.

By EDGAR J. FRASER.

A SINGLE light burns in the far corner of the office, its sickly gleam scarce dispelling the offended darkness, only half revealing, half-ashamedly as it were, a haggard face—the intruder. Bent over his desk, with papers to left and right, and in front of him, up on the rail some books and a ruler, behold a man signing his own death warrant. For that is what working late means. And yet one gathers from stray remarks in our JOURNAL how much of it there is, how much of this habitual working late, for casual late work is unavoidable; *e.g.*, no man with a sufficiency of work throughout the year can make up stock sheets in the working day. Does it not therefore behove us who know of it to ask "What is the cause?" for *in causa est remedia*. The reason must be one of three: Too much work, distracting interests, or incompetence (which usually means lack of method). It is an axiom that everyone has too much work, but not comparatively. He who has comparatively, and so in reality, too much work, cannot do it!

Distracting interests form a more fecund cause of arrears of work. While no one grudges the five or ten minutes' conversation about "the things that really matter in life," such as golf, tennis, chess, whist, etc., one has to realise that work will not do itself, and that every five minutes so spent mean ten spent later when others who have finished theirs and who would have helped us are out of reach.

But the most fruitful cause of the waste of light is incompetence, in so far as it involves lack of method. It is not too much to say that the idea of method is the most valuable, as it is the least common, corollary of intelligence. The predefining of the duties of the month, the week, the day is the first step to success in confining these duties to the month, the week, the day. No day should be left to bring its work; that should be allowed for, but each day should in advance be outlined in mind, its quota of routine and general duties thought out, its share of the larger (weekly or monthly) duties added to it. Each day should do its own work and all that was planned for it. Remember, there is no to-morrow for to-day.

I have said the idea of method is the least common corollary of intelligence. Why this is so, it would be hard to say. But I venture to repeat that most "working late" is due directly to this cause. You have the cause; you have the remedy; take—the remedy.

LIGHTNING EFFECTS AT NOTTINGHAM.

DURING a heavy thunderstorm last summer one of our poles, just erected but carrying no wires, was struck by lightning.

The earth wire, with the exception of about eight inches coiled round the pole near the top, had completely disappeared, and no trace of the staples which originally held the wire could be found. At the point where the staples had been fixed the pole was punctured as if by climbers, but the holes were bigger than those ordinarily made by climbers. A hole two feet deep was made in the ground where the earth wire entered. The hedge on the roadside, which was close to the pole, was badly scorched. The nails holding the roof on the pole were withdrawn to about half their length, but the roof was not damaged. The pole itself does not appear to be damaged otherwise than by the apparently sudden fusing of the staples. Three holes about one foot deep and one foot in diameter were made in the ground on the opposite side of the ordinary roadway from the pole.

Another incident occurred during the building of the same route. About two miles of wire had been erected on the poles, and left "dead" on the insulators at one end. At the other end the wires came down from the pole in coils, which were hung on a wooden fence. When the men went to pick up the coils to proceed with the work they received shocks similar to those from a Leyden jar discharge. The weather was cloudy and thundery, although no storm was taking place at the time.

EMPTIES.

By JOHN TULLOCH.

THE subject of our article plays no small part in the work of storekeeping. The suppliers who own the cases invariably require them to be returned, carriage paid, failing which their full (or sometimes half) value will be charged to us. And incidentally in may be remarked that the valuation of these empties at times by their owners makes one think what a good side-line it would be for them if this Company's officials were in the habit of losing many empties. It is necessary, therefore, that a record of the receipt and return of the cases which require returning be carefully kept. For the whole country the carriage of empties must be a very large item and must make the holder of the Company's purse-strings sigh for the old days when "returned empties" were carried by the railway companies free of charge. However, those days have passed. The next best thing to do is to see that our records are kept carefully enough to ensure that no empties are retained which will be charged for, and that no empties are charged for which have already been returned.

With the exception of cable drums, the method of recording cases returnable seems to have been left entirely to those who have to deal with them; apparently no instructions have ever been issued on the matter. It naturally follows that the methods employed are many and varied. A few words, therefore, on how "empties" are dealt with in the Chester and North Wales district will perhaps not be out of place. In the first instance, the Company's contract with the suppliers requires that when cases are returnable, the advice note and case be marked to that effect; otherwise the Company will not be responsible for them. The supplier's invoice almost invariably bears this request. It can, however, be easily judged in the case of an omission whether there is a case of any sort which may require returning, and these are recorded pending remarks from the local office. If the local office advises in the "Return of Empties" that the case was also without any request for its return, it is made use of by the Company. We can therefore take it for granted that the invoices all give the particulars required.

A foolscap book is then ruled as shown in Fig. 1, in which these *particulars* are entered, at the end of each calendar month.

FIG. 1.—RECORD OF EMPTIES (AT DISTRICT OFFICE).

Date received.	Date returned.	Delivery note No.	Registration No.	To.	Supplier.	Goods.	Marks, etc.
Dec 1	Jan. 8	81	1881	Llandudno	J. C. Fuller	300 S.A. cups	Cask 985 5s.
6	..	..	1900	Bangor	F. Smith & Co.	5 cwt. bronze	Cask 905.
8	..	..	1895	Colwyn Bay	Ballardie Holden	100 No. 2 carbons	?
11	..	..	1899	Llandudno	Pilchers	1 cwt. L.C. paint	Drum 2s. 6d.
25	Jan. 8	82	1901	Llandudno	British L.M.E.	12 wall sets	2s. ₰ 1859·60
26	..	..	1831	Colwyn Bay	Elect. P. Storage	Accumulators	Carboy 6s.

FIG. 2.—RECORD OF DELIVERY NOTES (AT DISTRICT OFFICE).

From.	Delivery note No.	Date received and sent out.	Date returned	Goods.	Registration No.	To.
Llandudno	81	Jan. 9	..	Cask 985	1881	J. C. Fuller
,,	82	,,	..	2 cases ₰ 1859·60	1901	B.L.M.E.

Cases returned in the same month in which they are received are not entered in the record of empties. The date of return and delivery note number are quoted on the duplicate invoice, and this information, together with the entry in the delivery note record, is sufficient to trace details of it if required. From the illustrations given, the various items can be traced through the three records. Of course, in the actual records abbreviations are used.

At the end of each month the returns of empties on hand are sent in from the local offices to be checked with the district office record. I may say that *all* cases received by local offices are entered on their lists. Any cases without request for return on them, or on the invoice, are disposed of to the best interests of the Company. Cases which have appeared on the local office record and afterwards returned, disposed of or transferred, as mentioned at the end of the article, are merely dropped out of the record without further remark. If a case is transferred, it appears on the new consignee's return with particulars of its receipt. Its history can then be traced if required. When delivery notes are made out

FIG. 3.—RETURN OF EMPTIES (FROM LOCAL OFFICES).

Date received.	Supplier.	Contents.	Description.	To.	Marked for return or not.	Why not returned.
Dec. 6	F. Smith & Co.	5 cwt. bronze	Cask	Bangor	Yes	Not empty
8	Ballardie H. & Co.	100 No. 2 carbons	Box	Col. Bay	No	No request
11	Pilchers	1 cwt. L.C. paint	Drum	Llandudno	Yes	Not empty
26	E.P. Storage Co.	Accumulators	Carboy	Col. Bay	,,	,,

for cases returned, the date of receipt, contents and credit slip number are quoted in addition to the usual information. This ensures the correct requisition number being quoted on the delivery note and credit given in the suppliers' record. Apparently, however, some firms do not keep their records as carefully as we might wish, as is shown by the enquiries which often come through the head storekeeper for empties which have already been returned. The particulars at the district office enable such empties to be traced immediately, and the local office is then asked for consignee's signature on the signed delivery note acknowledging receipt of the empty, for the head storekeeper's information.

All this may appear complicated at first sight, but in reality it is not so. It answers its purpose admirably, being better than keeping the suppliers' invoices themselves for record of the particulars of the cases. This latter method is not nearly so satisfactory; it causes more trouble when checking the local office returns, or when looking up particulars which may be required. Further, it is found that such a system or method as has been described is especially necessary in this district. It is perhaps unique as regards the area it covers, a long strip of country from Church Stretton, in Shropshire, to Nantlle, in Carnarvonshire, passing also through Cheshire, Flint and Denbigh, over 130 miles from point to point. As full advantage is taken of the opportunity to transfer stores from one centre to another in the district, the suppliers' cases are frequently being used, and with this system a proper check is kept on their wanderings until the time comes when they are returned to their owners. It would be interesting to know how other districts deal with their empties.

TYPISTS AND TYPEWRITING.

By JOSEPHINE R. KEIR, *Chief Typist, Glasgow.*

THERE are now few business houses which do not have their letters typed, and a short description of a typewriting department and some of its advantages might prove interesting to the readers of the JOURNAL.

Previous to November, 1904, the Company in Glasgow employed five typists, working in various departments, and it was found that whereas one girl had very often far too much to do, another was not fully employed. In order to obviate this, and to reduce as much as possible the typewriting expenses, the work was centralised and the correspondence dictated by telephone. Not only does this allow of the work being fairly distributed, but it is kept *absolutely private*, which was practically impossible when the typists were working in the public office.

We now have four typists doing really more work than the five did formerly, as, of course, with the large increase in business more correspondence ensues.

The department is in charge of the "chief typist," who attends to the switchboard and distributes the work. From this experience she can gauge pretty accurately the capacity of each member of the department.

There is a buzzer attached to the board, and when an indicator drops the chief typist's attention is drawn by this buzzer. She at once plugs in, and if the person speaking desires letters taken, he is put through to a typist. Each typist is provided with a head-gear set (similar to those in use in switchrooms) which she wears constantly, leaving her hands free for her notes. Should the person dictating be for any reason interrupted, the typist, on being told to "wait a moment," resumes typewriting, thus saving the time which under the old conditions was often spent waiting at the dictator's desk until he was free again.

Each dictating point has its number, and a code of references, based on these numbers, is used. The dictator, before starting his letter, states his reference, such as "13/A" and then proceeds with the letter. This reference number is the guide to the messenger who collects the letters from the department each half-hour.

The chief typist supervises all typed work, and is thus able to detect any typewriting or other errors.

A record of each typist's work is kept, and previous to the boy's calling, the letters are passed to the chief typist who checks them and hands them back to the junior, who counts them and places them ready for the messenger.

A summary of the daily record of letters is made out weekly, checked and signed by the chief typist, and passed to the chief clerk, who after examining it, passes it to be filed.

The record creates a friendly rivalry among the typists, and great interest is shown at the end of the day in the total number of letters typed by each. It is found that 60 letters per typist per day is a very fair average, although a girl has been known to do as many as 80 or 90.

The typists in Glasgow have certain hours for taking notes, and those dictating keep as strictly as possible to these hours, although in special cases the rule is set aside. The hours for dictation are from 9 till 12 a.m. and from 2.30 to 4 p.m. The typists, as a rule, clear off all their morning's dictation by 2.30 p.m. and the afternoon's work by 5.30 p.m. It is comparatively seldom that work is left over till the next day, as a clever typist can do a lot of typing in an hour and a half, if not interrupted.

I would just like to say a word about the qualifications of a typist. This is a subject which is not, I think, considered seriously enough by parents when it comes to the question of "What shall we do with our girls?" They seem to think, "Oh, here's a nice easy job; we'll make our girl a typist." Now, unless a girl has an aptitude for spelling and composition, she is absolutely unfitted for this class of work, where she either remains "third-rate" or fails entirely. If the inclination of the girls themselves were taken more into account, I am sure that 50 per cent. of those now sent to be typists would go to something else, at which I have no doubt they would meet with more success.

To get a knowledge of her capabilities it would be a good plan, in my opinion, when engaging a typist to give her a very stiff test, not only of her speed in writing shorthand and typing, but of her spelling, composition, etc. I would suggest that a subject be given and the applicant asked to compose a letter on same, she being given a few guiding directions. I have known a girl to get a typist's situation who was unable to put an ordinary business letter together.

In the case of an inexperienced girl taking a junior position, it would be advisable that she, where possible, take up evening classes on that very essential subject, English, which comprises all that is needful after she has learned shorthand and typewriting. Perhaps, were this taken advantage of to any extent, the Company would, as in the case of other classes, consider the advisability of paying the necessary fees.

In a typist neatness and cleanliness should be insisted upon. If a girl be neat and tidy personally, one can generally expect that her work will be the same. For instance, nothing looks worse than a bad erasure. The best of typists will make a mistake sometimes, but a tidy girl will neatly erase it; letters should not go out to clients with smudges or crossed-out errors in them.

A typist who *thinks* is sure to get on. If she be interested in her work she will make very few slips. Some girls work purely mechanically, with the result that as often as not the letter requires to be retyped. Some time ago a girl in typing a notice about evening classes stated that "it is *suspected* that the Company will pay the fees." Had this girl thought about what she was doing she would have seen the absurdity of this.

The care of the typewriting machine also is a matter of importance. We make it a rule to thoroughly clean type, etc., once a week, and to dust the machines each morning. We find that this keeps the typewriter in very nice condition, and we have been complimented by the "Densmore" mechanics on the well-kept appearance of our machines. A machine regularly cleaned will do better work and last very much longer than one carelessly kept.

HIC ET UBIQUE.

A TRUE story reaches us of a subscriber who reported that his wire had been off his battery, but that he had replaced it. The official who examined it pronounced it to be in perfect order, but cautioned him against interfering with the apparatus, as he might reverse the wires and so cause faults. He was greatly interested in the explanation of the direction of current, etc., and solemnly propounded the theory that if the current "ran the wrong way round" the other man would hear him speaking backwards!

A CELLULOID comb was nearly the cause of a tragedy at one of the Glasgow exchanges. A spark from the fire set the night-operator's comb aflame, and it was only by quickly enveloping her head in her apron that she was able to escape with an injured scalp. The habit of wearing ornaments of this inflammable material is very dangerous, and cannot be too strongly condemned.

AFTER having studied the fascinating headline, "Telephone Kicks Prostrate Trouble Operator," and evolved that "kicks" is a substantive and "prostrate" a verb, and not verb and adjective respectively, as they appeared at first glance, we learn from an American paper how a complaint operator is ill from "nervous prostration brought on by receiving 60,000 wails since last January. 'The continual strain brought on a collapse,' said the girl Thursday; 'when I woke up I thought that a horse had kicked me on the head.'" We suppose that "the girl Thursday" is a sort of feminine counterpart of Crusoe's man Friday.

IN our May issue we protested against the use of the expression "hello" which certain newspapers try to thrust upon us instead of the English "hullo." We have now an ally in the *Daily News*, which declared recently that the former expression reminded it of nothing so much as a cat sneezing. A few days later it put its principles in force with an article on "'Hullo' Girls," which is journalese for telephone operators.

A NEWLY-STARTED Canadian contemporary, the *Telephone Age*, courteously sends us No. 2 of their paper, a well got-up production. On looking through it we are arrested by the awe-inspiring title, "The Fate of a British Monopoly." Amongst other interesting things, we read how "at last the worm, in the shape of the public, turned"; how licenses were offered to municipalities, "but, unfortunately, not many availed themselves of them." We imagine that the worms in some places are now rejoicing that they did not turn, and that those who did turn are not over well satisfied with the result of their gyration.

GLASGOW DISTRICT.

SOME little trouble has been experienced recently in the Thornliebank district with broken insulators, and on Dec. 26 four boys were apprehended in connection with this and fined. Further, the police are circularising the board schools and Sabbath schools in the vicinity, with a view to preventing further trouble of the same kind.

CORRESPONDENCE.

AN EARLY TELEPHONE SOCIETY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I WAS very much interested in the account of the January JOURNAL of the Telephone Society formed in Birmingham in 1889, and thought your readers might be interested to hear that there was another Richmond in the field in those early days.

At a meeting of the Liverpool staff, held in H. 4, Exchange Buildings on Sept. 5, 1887, a society was organised by Mr. R. Hope-Jones (who was at that time Chief of the Electrical Department) under the title of the Electrical Engineers' Mutual Improvement Society. Mr. R. H. Claxton, then District Manager, was the first president. The meetings were held fortnightly, papers on electrical subjects being read by the members and afterward discussed by the meeting.

Unfortunately no record now exists of the meetings or papers read except press copies of letters which show that the first paper was read by Mr. J. Nevin on Jan. 5, 1888, the subject being "Batteries" the discussion taking place on Feb. 2.

Copies of several papers read in later years are still in existence, notably one in 1891 by the Engineer-in Chief, Mr. Gill, on "The Working of Trunk Lines," which deals with the then little known problems of transmission.

This society was carried on until 1898, meetings being held each year from October to the end of the following April, when from various causes the meetings were discontinued, although the society could not be said to have ceased to exist, as the library which was formed at the society's inception was still used by the members of the staft.

In 1902 a new society was formed, the initiative being taken by the present District Manager, Mr. E. J. Hidden, to whose active interest the success achieved is mainly due, and it has been followed by the formation of similar societies all over the country.

I enclose a programme of the session of 1889-90, this being the earliest which I have been able to obtain.

Programme of Session, 1889-90.

Sept.	5.	Annual Meeting.
,,	19.	"Magneto Bells." J. Nevin.
Oct.	10.	"Magneto Bells" (*continued*). J. Nevin.
,,	24.	"Phonograph." R. Sloan. (With experiments.)
Nov.	7.	"New Pattern Switchboard" (lime-light illustrations). R. Hope-Jones.
,,	21.	"Pole Erecting." Thos. Rowe.
Dec.	19.	"Best Form of Batteries for Telephonic Purposes." C. Gwyther.
Jan.	16.	"Line Faults." A. MAGNALL.
,,	30.	"'Blake' Transmitter and 'Bell' Receiver." J. Jones.
Feb.	13.	"Instrument Faults." A. Savage.
,,	27.	"Methods of Testing Circuits." J. Nevin.
March	13.	"Single and Double-Cord Board." W. France.
,,	27.	"Cabinet and Joinery Work." R. Ellinson.
April	10.	"An Instrument for Magnifying Sounds." R. Hope-Jones.
,,	26.	Practical Demonstration of Pole Erecting. Thos. Rowe.

Liverpool, Jan. 15, 1907. W. K. WOOD.

TELEPHONE ENTHUSIASM.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WHAT is enthusiasm? Essentially and primarily INTENSE INTEREST, with tact, perseverance and dogged determination as constituents; enthusiasm without the first essential cannot exist, and without "tact" is folly, without "perseverance" is impetuosity, and without "dogged determination" is doomed to many deaths!

Now, according to Mr. W. F. Taylor's article in the January JOURNAL, this is the sort of stuff the telephone man of America is composed of. I agree with him readily, but as he afterwards suggests there are *some* of that calibre this side of the Atlantic, one is happy to know they do not hold a monopoly of these qualifications in America, and that they are not included in the catalogue of "corners" or "trusts" so prevalent in the Western Continent. One may be forgiven in his own country for believing that there are many true-born Englishmen, with *no* American blood in their veins, who are real enthusiasts. I happen to know at least one rampant English telephone enthusiast, a regular glutton for telephone contracts.

I can hardly agree with Mr. Taylor when he says "the British business man thinks that as his grandfather and father got on without it he can also." I scarcely think this is characteristic of the present day "British business man," and it is to be hoped that no telephone canvasser will cherish this remark as even a remote excuse to fall back upon for not securing a contract, but will do as Mr. Taylor suggests, "fight it"; I am positively convinced that *any* real enthusiast can readily lead this class of British laggard out of such a derelict position.

And then, "the *atmosphere*." Not a bit of it. The English atmosphere ought to be good enough for the Englishman; I suggest there are sufficient essential elements in the variety of our English atmosphere to sustain all the enthusiasm that any man is capable of exhibiting, and if we mean to overtake the Americans (a large order, you may say, but 'tis always best to aim for the highest) then we must have enthusiasts! *Real* enthusiasts!! WHITE-HOT enthusiasts!!!

Hastings, January, 1907. B. GIFFORD.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I WAS much interested in Mr. Taylor's article on "Enthusiasm," and I feel sure that he has struck the right note. There is, however, one word that might be added, and that is—knowledge. It is a difficult task to get a man to be enthusiastic over something of which he has little or no knowledge. Apart from the aspect of the great commercial advantages of "being on the telephone," the Company's officers should feel confident that they know what they are talking about when *any* telephone question comes up, and not have to say "I will arrange for somebody to be sent who knows something about it."

There is one question I should like to ask: How many of the Company's officials, from seniors to juniors, including clerks, canvassers and collectors, have seen and had explained to them the inner working of an exchange? I have recently made enquiry, and I find that there are practically very few indeed who have any idea as to how things are done. In fact, some of the Company's representatives have never entered the sacred portals of an exchange. How can anybody educate or satisfy a subscriber in a matter if he has no knowledge himself? And, of course, the Company is judged by its representatives.

Needless to say, some of the ideas entertained are most erroneous. I have also come across several cases in correspondence where the subscriber states that when he signed the agreement he was led to believe certain things which are quite wrong. My conviction is that every employee of the Company who comes in contact with the public in any way should be taken over an exchange, preferably one on the common battery principle. I think the bulk of the staff would even be glad of such an opportunity, and not only would the additional knowledge enable them to take a more keen interest in their work, but they would be more sympathetic with the poor, ignorant public, and the result would certainly be beneficial to the Company's business, and would also give a greater prospect of advancement for the individual.

By the courtesy of Mr. Edmonds, I was recently able to arrange one or two visits of the members of the Metropolitan clerical staff to the London Wall Exchange, and, without exception, all were delighted with the opportunity and the knowledge gained by such a visit.

Salisbury House, E.C., January, 1907. WM. C. WHITE.

"THE BROADER VALUE OF THE CLERK."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

THE able paper written by Mr. Hare on the above subject has been read, I am sure, with great interest by large numbers of the staff, especially those particularly referred to therein. Their appetite for a further instalment will have been whetted, and the hints contained in the closing passages have raised a still more lively interest as to what we shall receive when brought to close quarters in the next paper.

The reason for this is the knowledge that so able a champion has been found to openly support a conviction held, at any rate, by a majority of the clerical staff, as obvious and indisputable, and a desire to see if the theory propounded will be substantiated by practical illustration. Because there exists an idea, and largely too it would seem, that advancement in the clerical department is necessarily a very slow process, even up to a certain given stage after which there is little or no outlet. In some provinces with large offices, one never learns of the chief clerk's promotion to a district managership, or the advancement of one of the senior clerks to a higher position maybe in another district or even at Head Office.

Now it may not be generally advantageous to transfer such officials to responsible positions in the electrical or engineering departments, probably in many instances they would not possess the necessary qualifications to fulfil the required duties, but if it were known such transfer was not only possible but probable, a goodly number would doubtless set out to make themselves efficient. Again there can be but few who have had a college education, passed in Arts, and become proficient in languages (if they had they would want something better than a clerkship in one of the Company's ordinary offices) but there are many in the Company's service who have had a sound commercial education and experience of a varied practical character. These must feel it would be most beneficial if some system were generally adopted and known to exist, whereby the senior clerks in the larger offices, where promotion is practically blocked and consideration at annual increases the only thing to be looked forward to and worked for (and which lessens both in result and interest as the years go on), may be transferred as chief clerks to small district offices with subsequent promotion to others, or to the staff at Head Office, according to ability.

Under such circumstances the enthusiasm, the necessity for which is pressed home so pointedly in the leading article of the JOURNAL, would the more certainly be likely to increase, *esprit de corps* would be fostered, and the aim of Mr. Hare as embodied in the above title be the more nearly attained.

Leeds, January 1907. G. H. S.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MR. HARE has struck a chord in his article on the "Broader Value of the Clerk," and more especially in the closing paragraphs, which will sound pleasantly in the ears of those who are quietly improving their knowledge of subjects which may appear on the surface to be somewhat off the beaten track for a telephone employee to pursue.

Especially when he refers to the fascination of learning, or trying to learn, new languages, will he reach the hearts of those who, although wading through the depths of declensions or struggling with hosts of exceptions and other necessary evils, find this same study one of such fascination, that at times there is a fear that other, and perhaps more immediately necessary subjects are being neglected.

Few and far between the records may be of successes in the commercial fields which Mr. Hare mentions; that is, records in our own JOURNAL. I am sure, however, that there are many N.T.C. clerks, junior and otherwise, who are seeking if not gaining laurels in this direction, the records of which will not be found in the JOURNAL.

"J. Jones, 1st class City and Guilds, Telegraphy and Telephony Ordinary," may perhaps be more interesting to the general readers of this journal than "T. Smith, Advanced Bookkeeping, 1st class," and that is, I feel sure, the reason why many members of the staff are wearing their hard-earned laurels in a tiny paragraph in the corner of some quiet provincial newspaper.

Mr. Hare's article is, however, true on the whole, I fear. It is interesting to a degree, and gives promises of still further messages of encouragement, instruction and hope.

To come to a fresh subject, it is interesting to see that an effort is being made to form a chess club in our capital, and the promoters deserve that every success attend their efforts. Will it be too much to ask that the moves of a game or two, in the event of the club being formed—especially of any games which may be likely to be of interest to chess players throughout the Company—be published in the JOURNAL?

With regard to Mr. Chester's request *re* "Portraits of Telephone Men," for my own part I would prefer that the JOURNAL be slightly smaller and thicker, that otherwise it remains as it is at present, and that an index of the contents be published at the close of each volume, for those who desire to properly bind their numbers. At present it would be somewhat too large to put in a bookcase, and yet I am quite sure that the twelve monthly issues will make as interesting and useful a book as anyone could wish to possess, and would be quite worth the cost of permanent binding.

Chester, January, 1907. "REFERENCE 3."

"METERS AND OTHER MATTERS."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IT is somewhat startling to find from the Editorial in the December JOURNAL that even our message registers, which we have been led to look upon as the *ultima Thule* of call recording are liable to error and to dispute on the part of the subscriber. No doubt, however, they are of distinctly greater accuracy than the forms of manual recording in use throughout the country; and the point to which I direct attention is that even with the apparent chances of inaccuracy that exist, although many disputes have been raised, no subscriber has yet been able to seriously shake our figures. It may be interesting to give particulars of two cases in which it looked very much as if the subscriber were going to prove himself right and us wrong.

The first subscriber disputed our record of calls in connection with his office telephone. He kept a record to check us, and brought it up for our inspection. He was a most businesslike man, and was absolutely certain of the accuracy of his record. We suggested private calls on the part of his staff. He said that he had only one clerk, whom he had instructed that he was quite at liberty to use the telephone for private calls, but must place them on the record. He had the utmost faith in that clerk. Notwithstanding, there was a wide difference between the two records, and we began to fear that we were in the wrong. However, we agreed to keep side by side with him for a limited time a special record, giving the numbers called. It turned out, of course, to be the clerk. He rang up his sweetheart on an average about three times a day!

In a more recent case, a gentleman called with regard to his house telephone record, and at his request was shown the card. He pointed out to us that we were charging him during the latter part of July, at which time his house was absolutely closed, and he and his family were on holiday. We had heard that tale before, and we cross-examined on it; suggested that somebody had instructions to look in occasionally, that it was some person's duty to clean the house now and again during the family's absence, etc., etc, all to no purpose. Subscriber was positive that no one had access to the telephone. He was a lawyer, and we had to take his word. We agreed to write off those calls.

Two or three days later the subscriber called again to apologise and pay the money written off. It appeared that in his absence the keys of the house had been given to the servant, who was given a holiday, and spent it with friends in Glasgow. She had instructions that the keys were not for use, but only left in her custody until required and on the return of the family she gave them an assurance that the keys had not been used. By accident, however, the subscriber discovered that this was not the case; she had been entertaining her friends daily at his house, and, of course, using the telephone.

The subscriber, immediately on hearing this, called, accepted our figures, paid the balance, and incidentally disproved the popular calumny of his profession. There is a vacancy for a "general" in his house.

Glasgow, December, 1906. J. M. ANDERSON.

TEAM WORK IN OFFICES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

ALTHOUGH I am not now in the district office, I hope that I may be permitted, with the interest I always had in the office work, to express my views on the above. With regard to Mr. Pratt's letter in the January JOURNAL, I cannot agree with his remarks, although, judging from his letter, he is writing from personal experience. In my opinion, when a matter of this description is being discussed one must keep in mind the conditions of the large offices, in which the watertight compartments chiefly exist. It is evident that a man in a small office will gain much more knowledge of the routine than the man in a large office, sharing the same work, on a larger scale, with of course a larger staff. Hence the former would be the more efficient; therefore, if efficiency is to be attained, there is something wanting in the management of the large office. A clerk with his fair share of work invariably, I think, would find that time would not permit him to find out how his fellow clerks' duties were performed. He may have very good ideas, but that does not constitute efficiency. One may have a deal of intelligence, but if time and circumstances do not permit, how is efficiency to be attained? As Mr. Pratt says, management is a great consideration, and, in my opinion, the only solution to the "watertight compartment" is that there should be a change about in duties when considered advisable.

If I placed a man in an engineering firm, and I wanted efficiency, I should require him to go through every shop. I should not be satisfied if he missed any branch of the work. Does not the same apply to our office departments?

Southend, January, 1907. S. G. LAST, Chief Inspector.

NEWSPAPER APPRECIATION.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I BEG to attach hereto cutting from the *Cambria Daily Leader*, Swansea, relative to the rush of telephone traffic incidental to one of the big football matches:

THE TELEPHONE ARRANGEMENTS.

We owe an expression of thanks to the officials of the National Telephone Company at Swansea for the admirable way in which our line to St. Helen's was kept clear on Saturday. We could not have been better served.

A special letter of thanks was also received from the *South Wales Daily News*, Cardiff, expressing appreciation of the efficiency of the Company's service under exceptional stress of business.

A few hours after the arrival of the South African team at the Hotel Metropole, Swansea, it was found that the traffic over the existing line was too much to cope with. The manager of the hotel was immediately seen and an arrangement come to for the provision of an additional circuit, which was in working order and in use within about two hours from completion of negotiations.

Swansea, December, 1906. A. E. COOMBS.

"AUTOMATIC BOX FAULTS."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MR. A. R. PULFORD seems to have lost sight of the fact that my article on "Automatic Boxes" did not deal with faults on them, and details of a too technical nature were purposely avoided in order to interest as many readers as possible. However, I think the fault that Mr. Pulford refers to is pretty generally known, and he certainly seems to cure it in rather an expensive way (extra cells, extra battery box, extra wiring, fitters' time, etc.). I have always found an effectual remedy in fitting two No. 1 dry cells in place of the No. 2, as, having greater capacity, they can give a current for a longer period before voltage falls. The additional cost is only a few pence, which should be more than covered by additional fees in the box; for if a caller uses the instrument for a long time, he should, at suitable intervals be asked for another penny. In Brighton we are immune from this fault, the exchanges being common battery; the current which operates the buzzer is always constant, but the test clerk tells me he gets the faults referred to occasionally at the outlying magneto exchanges. A failure also frequently occurs through the caller keeping the speaking key depressed; when told to release it the buzzer goes at once, the transmitter having previously been a shunt across the buzzer."

Brighton, January, 1907. F. J. FROST, Traffic Manager.

"LIGHTING AT POWER RATES."

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REFERRING to the recent correspondence in the JOURNAL in connection with the above, I fully endorse Mr. Wallace's remarks in the December issue. During a long experience of electric lighting and central station work I have only come across one public supply where current was supplied at power rates for a motor dynamo. All the others with which I have had dealings have emphatically refused to supply current for this purpose, other than at lighting rates. The reason for this is obvious.

Whilst writing on this subject, I should like to say a few words with a view to comparing costs of installing an exchange with a 200-volt system and with a 24-volt system. For this comparison we will take twenty 16 candle-power lamps:

16 candle-power lamps at 200 volts require ·3 ampere.
16 ,, ,, 24 ,, ,, 3·0 amperes.
∴ 20 lamps at ·3 ampere = 6 amperes,
and 20 ,, 3·0 amperes = 60 ,,

From the above figures it will be seen that much larger conductors would have to be installed for the 24-volt circuit, hence a much larger capital outlay.

Even if current were supplied at power rates for driving the motor dynamo, it is a question whether any saving would be effected, as in addition to the increased cost of mains, the size of the accumulators would have to be increased also, and the machine would have to do much more work in charging the cells for lighting purposes than is the case at present.

Oldham, January, 1907. W. B. CHEETHAM, Chief Electrician.

[Mr. Cheetham gives a rating of 3·75 watts per candle for the 200-volt lamp, and 4·5 for the 24-volt. Actually the difference would be the other way, *i.e.*, low pressure lamps are run at a less number of watts per candle than are high voltage lamps.—ED., *N.T.J.*]

A HORRIBLE ALLEGATION.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I HAVE pleasure in forwarding a letter which you may consider of sufficient interest to be worthy of publishing in the JOURNAL Translated, it is as follows:—

"25 4th Dec., 1906.

"SUR,—Kindly see you is gonducting a Bloody Murder with Electrical "appliances through 101, Little Oak Road, Aston. A vacant house with "Telephone."

The writer of this communication it has been impossible to trace. Investigation showed that No. 101, Little Oak Road was not an empty house, but attached to the chimney was a wire, not the Company's property, or one which had ever been erected by it.

Birmingham, January, 1907. H. JULIUS MACLURE.

[Several letters are unavoidably crowded out, in spite of another enlarged issue.—ED.]

FOREIGN AND COLONIAL INTELLIGENCE.

Austria. The number of local areas had increased at Jan. 1, 1906, to 335, as against 317 the previous year; the number of exchanges to 467 from 375; the call offices (excluding exchanges) to 737 from 592; the number of subscribers' stations to 53,051 from 47,820; the local calls to 164,158 597 from 155,116,053; and the trunk calls to 2,315 586 from 2,392,210. The wire mileage of the local lines stood at 267,981 kilometres, and that of the long distance lines at 25,549 kilometres. The Vienna-Innsbrück trunk line was extended to Trent (750 kilometres), so that Austria is now the possessor of one of the longest telephone lines on the Pupin system in the world. To reduce the number of intermediate stations so harmful to transmission on long lines, arrangements have been made that such stations with small traffic should only be switched in by telegraphic advice, and only for the duration of the call required. In the exchange at Meidling (a suburb of Vienna) two and four-party lines with a "selective lock-out" system of ringing have been introduced.

Bavaria. At the beginning of 1906 the Bavarian Post Office served 55,722 telephone stations and 2,779 public call offices. The mileage of wire was 243,861 kilometres, the number of local calls 74,560,816, and of long-distance calls 11,422,225. In all 717 female operators were employed.

Denmark.—The new directory (1907) of the Copenhagen Telephone Company (which operates on the island of Zealand) shows that the number of telephone stations increased during 1906 from 33,120 to 37,800; the stations in Copenhagen and surrounding neighbourhood rising from 24,500 to 30,300.

Russia.—The telephone completed its quarter-century in Russia last September, having been introduced in 1881 by the International Bell Company, who opened exchanges at St. Petersburg, Warsaw, Odessa, Reval and Lodz between 1882 and 1884. The telephone has now spread to 95 towns with 25,841 subscribers, whose lines have a mileage of 6,796 versts, and the wires 63,201 versts.

Transvaal.—At June 30, 1905, the length of lines existing in the Johannesburg district was 514 kilometres, or 12,330 kilometres of wire. In the Pretoria district 150 kilometres of line existed and 2,174 kilometres of wire. The following were the principal exchanges:—Johannesburg 1,387 stations, Pretoria 365, Germiston 60, Krugersdorp 36. There were 130 railway telephone stations and 23 public call offices.

Natal. The mileage of telephone wires in this colony was 3,711 kilometres, and the length of lines 216 kilometres. The mileage of private wire was 279 kilometers.

Southern Rhodesia. The number of subscribers at March 31, 1905, was 269: 117 of them being connected to the Buluwayo Exchange, 91 to Salisbury, 20 to Umtali, eighteen to Selukwe, and fourteen to Gwelo.

America.—The following are the numbers of telephone stations of the various Bell Telephone Companies in some of the principal cities in the United States and Canada as at Jan. 1, 1906. New York 221,902, Chicago 111,008, Philadelphia 75,846, Boston 75,896, San Francisco 49,853, Cincinnatti 26,047, Washington 20,268, Detroit 18,121, Montreal 17,161, Milwaukee 17,891, Toronto 15,353. The San Francisco system which was destroyed by the earthquake is being rapidly rebuilt, and 18,000 subscribers had already been joined up by September. The population of greater New York, to which the above given figure refers, is 4,081,051 inhabitants.

AN EARLY TELEPHONE SOCIETY IN SUNDERLAND.

By E. S. JARRETT.

ALL the members of the staff have no doubt read with great interest the programme of the first National Telephone Society established in Birmingham under the chairmanship of Mr. Alfred Coleman in 1889.

I have in my possession the minute book of the telephone society organised in Sunderland by Mr. C. B. Clay (then General Manager of the Northern District Telephone Company), as far back as March, 1887. The objects of the association as set out in the minutes were, briefly, to encourage the production and discussion of original papers on general and special telephonic working. The following were the subjects selected for discussion at the initial meeting:—Staying poles, storm repairs charges, magneto bells (transmitters and receivers), wood *versus* iron poles, diagonal system of running wires, improvement in detecting faults on long lines, method of operating trunk line calls.

A magazine club was also formed for the purpose of providing the members with the current electrical papers, Messrs. Preston, Bailey and Dalzell being responsible for their distribution.

The first paper read at the meeting was by Mr. G. F. Preston on "Iron Poles and General Construction Work."

The meetings took the form of a conference of all the district managers and engineers, it being the rule for any member to bring forward for discussion any points affecting the Company's interests that had cropped up since the previous meeting, whether on the engineering or commercial side of the business.

During the period of the amalgamation of the Companies the meetings lapsed for a short time, but were revived in 1891, there being at that time 22 members of the staff belonging to the society. The committee at that date were Messrs. Watts, Sibley, Hooper, Carey and Mackenzie, with Mr. Bailey as convener and Mr. Gibbon as secretary.

For myself, and if I may speak on behalf of my colleagues, I may say that the knowledge and experience gained at these meetings have been of great benefit to us all, and we are grateful to both the gentlemen mentioned for the enthusiasm and interest they took in training their staffs alike on the electrical and commercial side of telephony.

WHAT THE COMPANY IS DOING.

SINCE the last issue of the JOURNAL went to press the Company has opened the following fourteen exchanges (making a total of 1,287 in all): Loughton (London), Carlton (Nottingham), New Cumnock (Ayrshire), Tattenhall (Chester), Saltash (Plymouth), Willesborough (East Kent), Silkstone (Sheffield), Carrigtwohill (Cork), Potter's Bar, Sawbridgeworth (Herts and Beds), Standish, Halsall (Warrington), Coalville (Leicester), and Much Wenlock (North Midland); 4,242 stations were added in December, bringing the total to 407,738.

LONDON.—*Tavistock Hotel.*—A private branch exchange has been opened at the above hotel, with 168 stations and four lines to the Gerrard Exchange. The common battery switchboard is fitted for one operator.

Good progress has been made on the Barking to Tilbury extension. During December 4½ miles of pipes were laid.

Underground work between Chadwell Heath to Romford consisting of 3 miles of pipes and cables has been started.

At Wood Green trenching has been started and 1½ mile of blocks laid.

CARLUKE.—A 50-line switchboard section has now been fitted at this exchange, and the old apparatus removed.

COATBRIDGE.—An underground scheme has been sanctioned for this centre, and the complete reconstruction of the switchroom apparatus, the present apparatus being replaced by one 24-junction section, two 100-line magneto sections, and one 60-line party-line section with cable racks, etc.

HAMILTON.—The underground work is now completed at this centre. The first section of the trench was cut on June 27, and all the subscribers' lines metallic circuited and connected through the cables by Nov. 30. An estimate has been passed by Head Office for the laying of a 50-pair armoured dry-core cable across the river Clyde at Ross House on the main junction route. It is not proposed to do this work until the summer time, when the spate of the river will have fallen considerably.

UDDINGSTON.—A 100-line switchboard section has now been installed at this exchange.

WEYBRIDGE.—Extensive underground work is in progress here, and additional premises have been taken to meet the increase of business. Extensions also are being fitted to the switchboard.

BIRKENHEAD.—The underground work at Hoylake has been started. Under the scheme sanctioned for this town over 8 miles of pipes will be laid, and of this three-quarters of a mile was laid during December.

SUSSEX.—The extension of the underground work between Hurst and Hassocks was started during the month, and fair progress was made.

CHESTER.—Work has begun on the underground scheme at Colwyn Bay.

BRISTOL.—*Underground Extensions.*—During the past month 1,250 yards of cable on three different routes have been substituted for cables of smaller capacity, affecting between one and two hundred subscribers. The whole of this work has been carried out after 6 p.m., and all subscribers working the next morning. The subscribers were advised two or three days previously that their lines would be disconnected, and as the work was completed by the time stated no complaints were received. The jointing of cables to the Stoke Bishop and Westbury sub-exchanges which comprise 10, 20 and 40-lb. conductors has been completed, and will shortly be brought into use. Estimates for an underground system at Fishponds sub-exchange are being prepared. The extension of the main frame to accommodate an addition of 5,700 lines has been fitted and brought into use.

TEIGNMOUTH.—Underground work is in hand in this town, 880 yards of 3-in. pipe having been laid. It is anticipated that the cable will be to hand shortly.

SOUTHAMPTON.—Record working was brought into use at this exchange from Monday, Jan. 4, with very successful results. The switchboard party-line extension is now in hand.

GLASGOW.—*Charing Cross.*—An extension of the switchboard for 600 lines has been placed on order.

LONDONDERRY.—A new common battery equipment for 460 lines has been installed and brought into use.

NEWS OF THE STAFF.

Mr. J. A. SWANSON, Edinburgh District Office, has been appointed Chief Clerk at Greenock. Mr. Swanson, whose marriage was noticed in our September number, has been the recipient of much sympathy on the sudden death of his wife, which occurred on Dec. 8.

Mr. W. DALTON, Engineering Inspector-in-Training, Coventry, has been transferred as Inspector-in-Charge to Kettering.

Mr. E. E. SLEATH, Inspector, Coventry, has been transferred as Sub-Engineer to Coventry.

Mr. A. W. MANTLE, Inspector, Leicester, has been transferred to Coventry as Inspector, vice A. Bell resigned.

Mr. A. SWETNAM, Inspector, Hanley, has been transferred to Coventry as Inspector.

Miss WOOD has been appointed to the position of Supervisor, which has been created at Hanley.

Mr. F. A. SOWERBY, Inspector, Plymouth, has been transferred to Truro. Before leaving Plymouth he was presented with a handsome case of four silver-mounted briar pipes, subscribed for by the whole of the staff.

Mr. F. C. WALLACE, Inspector, Truro, has been transferred to Margate.

Mr. GEO. MURRAY, Draughtsman, Plymouth, has resigned the service in order to take up an appointment with the General Electric Company at Salford. A block amber cigarette-holder, gold mounted, together with a box of cigarettes has been forwarded him from the staff as a token of esteem.

Mr. W. A. MCCULLOUGH, Rental Register Clerk, Belfast, was presented by the staff with a handsome Gladstone bag and collar case on the occasion of his leaving the service to take up another appointment.

Mr. JAMES FOY, Instrument Fitter, Edinburgh, has received an award from the Company on account of a suggested improvement of the S.A. cup.

Mr. M. G. BROSSA, Canvasser, Contract Department, Hull, has been transferred to a similar position in the Contract Department, Liverpool,

Mr. E. MAINMAN, Instrument Fitter, York, was presented by the York staff with a portmanteau on the occasion of his leaving the Company's service to take up a position in New South Wales.

Mr. GEORGE FIELD, of the Electrical Staff, Cardiff, has been appointed Chief Electrician at Newport.

Miss A. M. TARRANT has been promoted from Chief Operator to Clerk-in-Charge, Eastbourne, and Miss R. MARTIN to be Senior Operator.

Mr. E. MANNING, Inspector, Sheffield, has been promoted to be Service Observation Clerk.

Mr. D. THOMPSON (late of Kettering) has been appointed Inspector-in-Charge, Rotherham.

Mr. R. P. CRUM, Exchange Inspector, South Side Exchange, has been promoted to be an Assistant to the Traffic Superintendent, Glasgow.

Mr. R. F. GILCHRIST, Rentals Clerk, Glasgow, has been transferred to the contract department as special officer engaged upon Development Study. Mr. Gilchrist has behind him some ten year's service, all of it spent in the Glasgow office, the last five years as Rentals Clerk.

Mr. JOHN W. MACDONALD, who has acted as Cashier for the past three years, has been appointed Rentals Clerk.

Mr. A. M. WATT, who has held the position of Cost Clerk at Glasgow for two and a half years, has been appointed Cashier.

Mr. JOHN H. H. BOYD has been promoted from the position of Petty Cashier to that of Cost Clerk.

Mr. JAMES F. SCOTT has been transferred from Dundee district to be Petty Cashier, Glasgow.

Mr. THOMAS BARTON who, owing to advancing years, has retired from his position in the Glasgow office, was recently the recipient of a surprise present. His fellow workers subscribed, and bought him a handsome easy chair, which it is hoped will contribute to the comfort of his leisure hours. This was delivered to him on Christmas morning.

Mr. H. LEGGE, Engineer at Brighton, has been promoted to a similar position at Portsmouth, and on the occasion of his leaving Brighton was the recipient of a silver-plated tea service, subscribed for by all ranks of the Brighton staff.

London Traffic Department.—*Transfers and Promotions for January.*

Mr. W. B. BENHAM, Exchange Manager, Avenue, has been transferred as Exchange Manager to London Wall.

Mr. P. J. MANTLE, Exchange Manager, London Wall, has been made Exchange Manager, Avenue.

Miss M. C. STEVENS, Senior Operator at Westminster Exchange, having been appointed Clerk-in-Charge at Colombo, Ceylon, has resigned her position in the Company, and sails for Colombo on Feb. 9. A farewell tea was provided, at which she was presented with a handsome gold bangle and brooch by the maintenance and operating staff at Westminster, and also by old associates at Kensington and Gerrard exchanges. Miss Stevens leaves with the heartiest good wishes from all for success in her new position.

Mr. F. A. HUNT, Divisional Engineer, City, has been appointed Local Engineer, Westminster.

Mr. A. BASCOMBE, Local Engineer, Gerrard, has been appointed Divisional Engineer, City.

Mr. H. M. CHAMBERS, Local Engineer, Hampstead, has been appointed Local Engineer, Gerrard.

Mr. J. ROBERTSON, Local Engineer, Westminster, has been appointed Local Engineer, Tottenham.

Mr. W. B. CUMBERLAND, Local Engineer, Tottenham, has been appointed Assistant Engineer, Paddington.

Mr. H. BIGLAND, New Business Agent, Salisbury House, has been appointed Contract Agent, Western District.

Mr. W. CLARKE, Assistant Engineer, Gerrard, has been appointed Local Engineer, Bank.

Mr. W. PENSON, Local Engineer, Bank, has been appointed Local Engineer Avenue.

Mr. R. AKEHURST, Wayleave O cer, Kensington, has been appointed Assistant Engineer, Gerrard.

Mr. H. WHITE, Assistant Engineer, Gerrard, has been appointed Assistant Engineer, Paddington.

Mr. H. TURNER, has been appointed Assistant Engineer, Gerrard.

MARRIAGES.

Mr. B. S. COHEN, chief of the Investigation Department of the Engineer-in-Chief's office, was presented on Jan. 14 with a tea service, pair of candlesticks in silver, and a silver-mounted claret jug, on the occasion of his marriage, which took place on Dec. 24. The gifts came not only from the staff of the Engineer-in-Chief's office, but also from members of the staff in the Metropolis and provinces. Mr. Gill, in making the presentation, referred to the service rendered by the Investigation Department on the scientific side of the Company's business, and particularly commended the valuable work done by Mr. Cohen.

Mr. COHEN desires to thank his many friends for their handsome present.

MR. E. S. BRAITHWAITE, Chief Inspector, Bournemouth, was presented on Dec. 20, 1906, with a Royal Doulton dinner service and a set of jugs by the Bournemouth staff on the occasion of his approaching marriage. The local manager made the presentation.

MISS E. MERCHANT, Supervisor, Swansea Exchange, resigned to be married. She had been in the Company's service eleven years, and had during this period, never been late. Prior to her leaving, Mr. W. E. Gauntlett presented her on behalf of the operating staff with silver-backed brushes, hand mirror, etc., suitably inscribed, as a token of regard.

MISS HAYES, Operator, Hanley, has resigned to be married.

Mr. H. H. PARKIN, Inspector, Dewsbury, was married on Dec. 22 last, and was presented by the members of the staff with four handsome pictures.

Miss E. BOYDEN, Senior Operator, Bradford Exchange, has recently entered the married state, on which occasion she was presented with an oak timepiece by her colleagues.

Mr. P. G. MARTIN, Switchroom Inspector, Dundee, who was married on Christmas Day, was presented with a marble clock, subscribed for by his colleagues.

Miss H. BAKER, Operator, London Wall, has resigned to be married.

OBITUARY.

The sympathy of the entire staff will go out to Mr. C. C. WORTE, the District Manager, Hull, in his sad bereavement. Mrs. Worte passed away in her sleep on Tuesday night, Jan. 15. She had not been well for some considerable time, but her death was altogether unexpected. Over 100 members of the staff subscribed towards a wreath, which was forwarded as a token of their sympathy.

Miss FLORENCE WAKELING, Operator, Gerrard Exchange, London, was, we regret to report, shot by her fiancé at Brixton on Jan. 12. Miss Wakeling, who only entered the Company's service last June was a member of the Provident Society from whom her relatives have received the usual grant.

Miss FLORENCE SALTER, Operater, Hop Exchange, London, died on Jan. 17 from the effects of the serious injuries she received from burning, her clothes having accidentally caught fire. She had been in the service since 1900.

Miss WICKHAM, the Chief Operator at Barrow, died on Jan. 6, of pneumonia, after an illness of only three days.

STAFF GATHERINGS AND SPORTS.

London.—A grand concert, organised by the Southern Football Club, connected with the old southern district, is announced to take place at the Caxton Hall, Victoria Street, Westminster, on Friday evening, Feb. 15, at 8 p.m. The following artists have been engaged:—Miss B. Cooper, soprano; Miss Daisy Sullivan, contralto; Miss Theresa Pearne, elocutionist; Signor Chas. I. Corti, violin; Master A. Duffy, treble; Mr. H. J. G. M'Millan, tenor; Mr. J. Taylor, baritone; Mr. Bret. Hayden, siffleur; Messrs. Fred. Wilden and Chas. Thornton, humorists; Mr. S. Chapman, sleight of hand; and Mr. F. Saunders, accompanist.

Northern.—The annual smoking concert of the Northern district staff was held at the Crown & Castle Hotel, Dalston, on Friday evening, Jan. 11, 1907. Mr. J. A. Hunt presided, and the success of the evening was greatly enhanced by the presence of Mr. C. B. Clay (metropolitan superintendent), Mr. C. Elliott (*metropolitan engineer*) and Mr. G. F. Greenham (*maintenance electrician*), together with several divisional engineers and prominent officials of Salisbury House. A very successful programme was provided, the performers including several members of the staff, viz., Messrs. J. W. Simons, A. McGregor and W. Riches. During the evening Mr. Hunt, on behalf of the Northern district staff, passed a vote of thanks to Mr. Clay and the other visitors for their kind attendance. Mr. Clay replied that it gave him great pleasure to be present at the social gatherings of the staff whenever possible, as it was only on such occasions that he was able to get into closer touch with all the members of his staff. Mr. Elliott replied on behalf of the visitors.

London Wall.—On Saturday, Jan. 19, a very successful social evening was held at London Wall by the operating staff. About 80 persons sat down to supper, Mr. Harvey Lowe being in the chair, supported by the traffic manager, Mr. J. F. Edmonds. The guests included members of the Metropolitan traffic department, the accountants' office, and electrical staff from other exchanges. Letters were received from many others expressing their regret that previous engagements prevented their attendance. During the evening the late exchange manager, Mr. P. J. Mantle who has recently been transferred in a similar capacity to Avenue, was presented by Miss Butcher on behalf of the London Wall staff with a gold watch-chain as a token of their esteem. An excellent concert due to the efforts of Miss J. Pitman was arranged; the items on the programme with the exception of recitations by Mr. H. Deane, being provided entirely by the

London Wall staff. The proceedings were brought to a close at 10.30 by the passing of a cordial vote of thanks to the ladies responsible for the entertainment, and the singing of the National Anthem and "Auld Lang Syne."

C. B. Clay Football Challenge Cup Competition.—On Jan. 19 Salisbury House and the Southern district met at Surbiton to play their semi-final match in this competition. Owing to the fog the train service was disorganised, and in consequence a late start was made, when however about 100 keenly interested members of the staff (including a contingent from Weybridge and Guildford) were present. Salisbury House won the toss, and for fifteen minutes from the kick-off were overwhelmed by their opponents, who combined splendidly, and, amidst great enthusiasm, drew first blood. After this reverse Salisbury House gradually pulled themselves together, but could not equalise before the interval. They, however, drew level shortly after the resumption, and, continuing to have slightly the better of the game, succeeded in gaining the lead through a good shot by Ashburner. Nothing further being scored, a strenuous and exciting game ended in a victory for Salisbury House by two goals to one. They now have to meet the Western district in the final on a ground and date yet to be arranged.

Gerrard.—The third annual dinner of the Gerrard Street male staff past and present was held at the Swiss Hotel, Old Compton Street, on Friday, Dec 21, when over 80 sat down to an excellent repast. Mr. C. E. Humphery made a capital chairman, his supporters being Mr. C. F. Arrowsmith, exchange manager, and Mr. R. Drury (Westminster). Practically the whole of the staff at Gerrard Street was present, and they warmly appreciated this opportunity of meeting old friends who had passed to other centres. Amongst them were Mr. Milne (Paddington), Mr. G. Cooke (Bank), Mr. Johnston (North), Mr. V. E. Moir (secretary of the National Society). After the usual toasts the evening was given up to conviviality. Various musical items were contributed by Messrs. R. Penson, Milne, Cooke, Sullivan and Beaven. Messrs. Rassill and Eaton were at the piano.

Nottingham.—A football match was played on Saturday, Jan. 12, between the Factory and the General Post Office (Nottingham) before a good crowd of spectators. The Factory lost the toss, and, though facing a strong wind, managed to score once through Wilcockson. In the second half, with the wind, the Factory had all the game, and scored twice through Grainger and Lee, thus winning 3—0.

Reading.—A football match, Married *versus* Single, of the Reading staff, was played on Saturday, Jan. 12, the result being a win for the Married by 5 goals to 2. The match, which was an exceedingly enjoyable one, was refereed by Mr. A. Garner.

Norwich.—The football club held a successful smoking concert on Dec. 21, Mr. H. J. Allen, contract manager, presiding. The musical programme consisted of vocal and instrumental music, contributed by the staff, and gramophone selections.

Swansea.—The operating staff here held a social evening on Wednesday, Jan. 16, at the Grosvenor Café, in connection with the resignation of Miss E. Merchant (supervisor), to be married. All the available staff were present and a most enjoyable time was spent. Miss Campbell presided.

Manchester.—On Saturday, Jan. 12, 1907, some of the members of the Bradford district staff paid a visit to Manchester. An interesting programme had been arranged including visits to the Central Electricity Generating Station and the chief Fire Station. During the afternoon a football match was played by teams from the respective districts which ended in a win for Manchester, the score being 3 goals to 1. A dinner and smoking concert which was held in the evening was thoroughly enjoyed by all present.

Hull.—On Dec. 21, a smoker was held at the London Hotel, at which Mr. Thomas Beecroft, contract department, Hull, was presented, on the occasion of his transfer from Hull to Birmingham, with a smoker's cabinet on behalf of the Hull staff by Mr. C. C. Worte, the district manager. The chair was taken by the contract agent, Mr. W. R. Senior.

Guildford.—The Salisbury House football team visited Weybridge on Saturday, Jan. 12, to play the Guildford district, and a most enjoyable game ended in a win for London by 7 goals to 2. After tea a smoking concert was held at the Holstein Hall, and a very pleasant evening spent under the chairmanship of Mr. J. S. Best (Weybridge) supported by Mr. Payne (London) and Mr. E. Greenwood (Aldershot). It was regretted that neither Mr. C. J. Phillips nor Mr. W. E. Potter were able to be present. During the evening the chairman presented Mr. Wild, captain of the winning team, with "the Earthenware" (not "the Clay" Cup) to the great amusement of everyone present. A vote of thanks was passed to Mr. Brown for his kindness in allowing the use of the school ground for the occasion and also for most ably officiating as referee. The teams were—London: Goal, Lowe; backs, Howe and Wild (capt.); halves, Hibberd, Blackford, Cherry; forwards, Bees, Bees, Vidler, Gilbert and Hudspith. Guildford: Goal, Garfath; backs, Turrell, Lindop; halves, Arnold, E. Patrick and Whittingham; forwards, Little, T. Patrick, Black (capt.) Willshire and Cull.

Glasgow.—The dinner of the Glasgow staff was held at the Bath Hotel on Jan. 18. The large dining-room was filled. The meeting was a very representative one, and the district managers of the various Scottish districts and several members of their staffs were present. Mr. F. Douglas Watson occupied the chair and after the usual loyal toasts had been duly honoured, he proposed the toast of "The National Telephone Company." Mr. Watson was reminiscent of the old Glasgow days, and laid emphasis on the entire loyalty shown by the staff in the strenuous telephone fight which recently took place. Mr. W. A. Smith, who replied, followed in the same strain giving many most interesting experiences of the time when telephones were being introduced in Scotland, especially of the prejudices which were met and had to be overcome upon the introduction of "that instrument of Satan." Mr. W. A. Valentine, in proposing "Our Guests," suggested that Mr. Smith's reminiscences would be of interest to the larger community who read the TELEPHONE JOURNAL. The toast was replied to by Mr. Andrew. Mr. Stockens proposed "The Chairman," stating that the regard in which the chairman was held had something to do with the loyalty of the staff. The chairman and Mr. W. A. Smith referred in feeling terms to the loss the Company had sustained in the tragic death of Sir James Fergusson, Bart.

The annual staff dance was held on Dec. 28, in the Prince of Wales Halls. All the various departments were represented and with a few outside friends over 80 couples took part. Mr. R. Trenwith, who acted as M.C., and the committee who made the necessary arrangements, are to be congratulated on the success which attended their efforts, as the dance was a most enjoyable one.

Brighton. The National Telephone Rifle Club held their first annual prize shoot on Friday, Dec. 21, 1906, at the splendid indoor range of the Imperial Rifle Club, Madeira Road. In addition to the number of prizes offered, Mr. Taylor, Mr. Roberts and Mr. Legge also contributed to the list. As was fully expected, an excellent exhibition of shooting was witnessed, a keen contest resulting as follows: Messrs. Brickett and Brackley tied for the first place (both making possibles); Mr. Dalton was third; Mr. Davidson, fourth; Mr. Gunn, fifth; and Mr. Crease, sixth. Juniors' Prize Shoot: M. Willard, first; A. Bonham, second; Reakes, third. The club is making very good progress and have accepted a challenge from the Naval Volunteers at Hove, and have challenged the Imperial Rifle Club.

Sheffield.—The staff Social Club held their first social evening at the Cutlers' Hall on Jan. 15, when a most enjoyable evening was spent by 160 members of the staff and their friends. Dancing was indulged in until 1 a.m. The non-dancers were entertained by a whist drive and also by cinematograph and conjuring entertainments.

Dundee.—An annual event took place on Dec. 29 last, when between 40 and 50 employees, including former members of the Dundee staff from Blackburn, Glasgow, and other places, met and spent a very pleasant evening. A long programme (including songs, recitations, violin, piano and flute solos, and a dramatic sketch), was creditably sustained by those present, and much enjoyed by the less talented portion of the audience; the meeting being perhaps the most successful yet held.

Birmingham.—The annual ball and *conversazione* of the district staff was held in the Masonic Hall on Jan. 11. About 140 members of the staff and friends were present. The programme comprised dancing, whist drive, exhibition of lantern slides by Mr. Baldwin, and a concert, to which various members of the staff contributed. Among those present were Mr. Cotterell, assistant provincial superintendent, and Messrs. Hooper, Maclure, and Smith (Wolverhampton).

Bristol.—To Bristolians in other parts. Kindly note that the annual football match will be played on the Clifton Downs on Feb. 19 next.

LOCAL TELEPHONE SOCIETIES.

Glasgow and West of Scotland.—The fourth meeting of the session was held in the Glasgow Technical College on the evening of Dec. 19, when, in the absence of Mr. B. S. Cohen (who was unavoidably compelled to postpone his paper till a later date in the session), Mr. J. K. Murray read a paper entitled "Tunbridge Wells and its Telephone System." As before coming to Glasgow Mr. Murray was local manager at Tunbridge Wells, he was able to give the society a most interesting description of the Company's work at Tunbridge Wells, both prior to and since the absorption of the municipal system there. Mr. Murray was cordially thanked for having prepared his instructive paper on very short notice. The fifth meeting was held in the college on the evening of Jan. 16, Mr. J. R. Brown, the Glasgow contract agent, reading a paper on "Contract Department Working." After describing the method of training a canvasser, the lecturer gave a number of very convincing figures illustrative of National Telephone progress in Glasgow and elsewhere. He emphasised amongst other things the educative value of call offices, expressing the opinion that that subject was worthy of a separate paper. Both the above-mentioned papers were followed by discussions in which, it is gratifying to note, some of the younger members are beginning to participate, and the lecturers replied to the points raised.

Cardiff.—The third meeting was held on Jan. 15, Mr. Whetton, in the unavoidable absence of the district manager, presiding over a good attendance of members. A paper was given by Mr. J. James on "Line Faults, their Localisation and Prevention," which was thoroughly appreciated. Two very encouraging features were the large number of members who took part in the discussion, and the interest taken by the Contract Department in this subject.

Blackburn.—The fifth meeting of the session was held in the Weavers Association Rooms, Blackburn, on Jan. 11, Mr. Remington being in the chair. No less than 62 members were present, and Foreman Hood, Burnley, who read a paper on "Construction and Maintenance of Aerial Plant" was closely followed. The principal points dealt with were: Efficiency with economy; construction and supervision; some disadvantages in present construction; composition of gangs and their knowledge of testing.

Southampton.—It is purposed to form a telephone society for this centre.

Liverpool.—The third meeting of the session was held on Thursday, Dec. 20, (Mr. Hidden in the chair), when Mr. Shackleton read a very interesting paper entitled "Economical Construction." It is understood that this paper has already been read before the Manchester Society, and will be read at a later date to the Birmingham Society. Mr. Shackleton was very much at home with his subject, and nothing was lost in his rendering. The discussion mainly centred around the question of loading coils, their use and cost, and also the theoretical position of exchanges. The chairman also drew the attention of the members present to the importance of familiarising themselves with development studies, etc., as far as possible.

Hanley.—The third meeting of the telephone society was held on Dec. 14, Mr. T. H. Schofield (vice president) in the chair. A paper was read on "Intercommunication Sets and Installations" by Mr. R. E. Deakin of which the

following are the principal heads:—Definition of an intercommunication system as compared to other systems; types of instruments; (1) bell in reply circuit providing against switch being left in wrong position; (2) bell on contact on switch and on H.M.T. spring so that the bell is always in circuit; (3) secrecy keys and circuits to prevent overhearing and maintain privacy of conversation; "plunger" type of intercommunication set explained and use of automatic release; wiring of installations; cables for installations; colouring; methods of jointing; convenience and economy of triple joints; where to make the joints; comparison of central battery with local battery systems for both speaking and ringing; best position of common battery; use of a common return; earthing common return and cross talk.

Swansea.—On Monday, Jan. 7, an interesting paper was given by Mr. Smith (assistant engineer) on "Underground Construction." The district manager (Mr. W. E. Gauntlett) presided. On Wednesday, Jan. 9, the operators' telephone society held its fourth sessional meeting, the subject under review being "The Quarterly Curve, its Use and Abuse." An instructive paper was given by Mr. A. E. Coombs (exchange manager). Mr. W. E. Gauntlett presided over an attendance of 95 per cent. of available operating staff.

Dublin.—The seventh meeting of the session was held on Jan. 7 in the provincial superintendent's offices, Mr. C. H. Sibley, district manager, in the chair. Mr. R. H. Gilliland, switchboard inspector, gave an interesting and instructive paper on "Switchboard Maintenance," fully illustrated by diagrams. Mr. R. J. Bartley, contract agent, also gave a short explanation as to the Company's rates. Twenty-nine members of the staff were present.

Plymouth.—On Nov. 13, a paper was given by Mr. W. E. Walton on "Central Battery Working," and was illustrated by lantern slides kindly loaned by the Engineer-in-Chief. The district manager presided over a well-attended meeting. On Dec. 4, a paper by Mr. H. W. Roberts on "Faults," was given to an appreciative audience, and an interesting lecture followed by a keen discussion brought a pleasant evening to a close. On Jan. 8 a valuable paper on "Exchange Organisation" was given by the district manager (Mr. P. F. Currall) to a good audience, and was followed by a useful discussion.

Manchester.—A paper was read on Friday, Jan. 11, by Mr. Staite, on the subject of "Junction Working." In the course of the paper Mr. Staite pointed out present difficulties and how they might be reduced. The essential qualities of good junction working were also clearly explained. Diagrams and tables illustrating the various points raised in the paper were shown, and an interesting discussion brought an instructive evening to a close.

Coventry.—A meeting of the South Midland District Telephony Society was held on Monday, Jan. 14, Mr. John Mewburn (president) presiding over a large percentage of members. A paper of an interesting and instructive nature was read by Mr. C. Sadler upon "The Relationship of the Local Office to the District Office." Discussion was freely entered into, and several questions were asked. On the whole the tone of the meeting was good, and augurs well for the success of the society. It was decided at the close of the meeting to arrange for a social evening amongst the members and their friends, and that it should take the form of a whist party.

Birmingham.—On Jan. 14 Mr. J. M. Shackleton delivered a paper on "Engineering Economics" at the district office. There was an attendance of 76 members. The paper was listened to with very great interest. The main item of discussion was on the life of material such as creosoted poles, larch poles, concrete blocks and iron pipes.

Leicester.—The second of the series of meetings was held on Friday, Jan. 11, at the Foresters' Institute, with an attendance of 80 per cent. of the total members, the chair being taken by Mr. F. H. Barber, vice-president. The subject, "The Test Room," was capably handled by Mr. P. V. Sansome, who by the aid of diagrams clearly explained the apparatus in use. Different methods of testing were gone into and the code books and test records shown. Owing to indisposition Mr. Bagley was unable to be present, and the rest of the evening was occupied by Mr. Ernest Rendell with the first part of a paper on "Party Lines." The third meeting of the society, on Jan. 18, proved very satisfactory, there being a muster of 74 per cent. The chair was again taken by Mr. F. H. Barber (in the regrettable absence of the president, indisposed), who announced a lecture by Mr. H. Laws Webb on March 4. The second part of Mr. E. Rendell's paper on "Party Lines" was then taken, and the old and new methods of two party line working (showing the advantages of the latter) were first explained with the aid of diagrams. Selective ringing on four party lines was then taken, the ringing machine for producing pulsating, positive and negative currents, and the arrangement of biased bells being explained. A rather good suggestion arose out of this. The lecturer proposed to use the same four keys (ringing) on twenty party omnibus lines—whereby only five subscribers would be rung simultaneously and with not more than two rings each, thus: (1) One long ring, (2) two short rings, (3) one long and one short, (4) one short and one long, (5) two long rings; this code is repeated on each key thus calling twenty subscribers as explained. Some American selective methods were next described, bringing a most interesting and instructive paper to a close. Both paper and diagrams exhibited a thorough grasp of the subject and showed that a vast amount of time and care had been spent thereon. Mr. Bagley's paper on "Underground Work" proved most interesting and instructive, and was illustrated by several specially prepared coloured drawings of the joints on sheets of paper, 40 by 30 inches, and by diagrams showing the method of distribution in the new 600-pair Stoneygate cable. Mr. Price demonstrated the financial benefits of the distribution scheme of this particular cable, emphasising the importance of a careful study of the conditions obtaining on each cable route.

Bristol.—The inaugural meeting took place on Jan. 17, the chair being taken by Mr. A. Perkins (district manager), vice-president. There was a very good attendance. A presidential address was given by Mr. Dalzell, provincial superintendent, followed by his greatly appreciated lecture on "Departmental Co-operation and how it Affects Development." The enthusiam shown at the meeting augurs well for the future of the society.

London (*Southern*).—A meeting of this society was held on Jan. 17, a paper being read by Mr. B. B. Johnson, entitled "The Silvertown Test Set." An interesting discussion followed the reading of the paper. A lantern has now been purchased by the society, a few slides were shown previous to the meeting proving very satisfactory.

Newcastle-upon-Tyne.—The third meeting of the district telephone society was held on Dec. 20, when three very interesting papers on "Squared Paper" were read by G. S. Brown, A. Livingstone on "General Testing," and by F. W. McArdle on "Erecting Poles." The latter paper was illustrated by a model of a pole, derrick and fittings. Mr. Drummond, district manager, occupied the chair. Mr. Jackson, (local manager) presided at the fourth meeting on Jan. 17, when two papers were read by M. T. Bryne on "Faults" (technical and otherwise) and P. H. Sills on "Telephone Line Properties." Mr. Byrne's paper dealt with every day faults in a very skilful way. Mr. Sills paper was illustrated by a number of diagrams.

DRAWING OUT CABLE AT LEICESTER.

By LEONARD PRICE, *Local Manager.*

A NEW 600-pair cable has been laid from the exchange to Clarendon Park, a distance of 2,600 yards. One section of the route, 490 yards in length consists of two 204-pair cables (20 lb.) in the two existing pipes, one of which was to be withdrawn. The latter contained 185 working subscribers' lines, 100 of which we transferred to spare circuits in the parallel cable.

The remaining 85 subscribers were advised that their service would be interrupted from Saturday midnight to Monday morning, Nov. 10 to 12. At 12 midnight the cables were cut. The 204-pair cable in four lengths was drawn out, drummed up and the new cable drawn in by 11.45 Sunday morning, about 13 to 14 tons of cable being handled in twelve hours. The subscribers were joined through again by 12 o'clock Sunday night, with the exception of six; these were completed first thing Monday morning.

In drawing out the cable a quicker method than paying out through the manhole openings had to be devised, apart from the fact that the latter in most cases were not in convenient positions. A hole about 1 foot square was cut in the wall of the chamber above the pipes with a sloping trench up to the roadway level. A start was given with the winch for a few yards, and then two horses were attached to the rope (one was found to be insufficient) and the cable drawn straight out. To prevent damage to the sheath by friction on the roadway, a number of men ran along with it, and placed old cross-arms under the cable at a distance of about 9 feet apart, the grease already on reducing the friction to a minimum.

Fortunately no trouble was experienced from the grease setting, although the cable was laid six and a half years ago. In places hard patches were found, but not sufficient to hold the cable, bearing out the advisability of using a minimum amount of grease in laying. Possibly, petroleum jelly might be a cheaper lubricant in the long run. The drumming up was a quick and simple operation with the cable laid straight out, the maligned cable wheels proving very useful where a stationary drum on jacks would have been useless. Another advantage was preserving the sheath in good condition; but for the grease, the cable looked as good as new. This is important, as its second-hand value is £120.

The holes in the chamber walls also greatly aided paying in the 600-pair cable, a much better sweep being obtained than was possible through the ordinary openings. As many are doubtless aware, this size of cable, owing to its solidity, will admit of very little bending beyond the natural sweep from the drum.

The estimated cost for laying 2,600 yards of 600-pair and 1,400 yards of 25 and 50-pair was an average of 4*d.* per yard; the heavy cable would, of course, be above, and the small size below that figure in actual cost. Allowing 2*d.* per yard, an ample amount, for the small cable, 5*d.* per yard is left for laying the 600-pair, while 3*d.* per yard is allowed for the drawing out, which gives an average of 4*d.* for this particular job. The actual cost of the drawing out and pulling in, including hire of horses, was 3·6*d.* per yard; all labour was at double rates of pay, being Sunday work.

Certain preparatory work was necessary, which should perhaps be added to the cost. The macadam and granite sets in the roadway were broken up previously in nine places, and the manhole walls cut in readiness, while considerable labour was attached to getting the cable, winches, tools, etc., to and from the job, and a watchman was provided. Including this, the total cost works out at 5·4*d.* per yard, the greater part being double wages. Reduced to ordinary rates of pay the cost would be 3·6*d.* per yard.

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TELEPHONE MEN.

X.—ALFRED COLEMAN.

ALFRED COLEMAN was born at Gravesend, Kent, Aug. 28, 1854, and he was educated at Blundell's School, Tiverton, Devon. In 1873 he entered the Telegraph Engineers' Department of the North Eastern Railway, under the late Mr. A. GRAVES, and passed through every branch of the Department; after this he entered the Telegraph Engineers' Department of the Midland Railway. In 1878 Mr. COLEMAN was one of the applicants for the position of Telegraph Engineering Inspector for the Lancashire and Yorkshire Railway, and obtained the appointment. He was placed in charge of the Western Division, with headquarters at Manchester. Under the Telegraph Superintendent, the late Mr. E. C. WARBURTON, he had charge of all the electrical and telegraph engineering work in the Lancashire District, which had a mileage of 325 miles. He was in this position three and a half years, and obtained there, besides a very extensive experience of telegraph line construction and of nearly every form of electric telegraph instrument, some experience with work which was somewhat new to the telegraph engineer of that day—the use of hard drawn copper wire for line work, of aerial cables, and of electric lighting both with arc lamps and with the then new incandescent electric lamp.

At this time the telephone was exciting much interest amongst telegraph engineers. Mr. COLEMAN was much impressed with the possible development in telephony, and felt a strong desire to enter the work, but was afraid to throw up a good position for what seemed to most an uncertainty. At last he wrote to the United Telephone Company, and had interviews, at one time with Mr. J. B. SAUNDERS, and later with Mr. MORGAN; he was offered an appointment as District Engineer, but did not accept. The result of this, however, was that later Colonel JACKSON, the Chairman of the National Telephone Company, offered him the position of Manager at Bradford. This offer was accepted, but owing to a misunderstanding he was sent first of all to Huddersfield and became Manager there on Oct. 3, 1881. At this time Colonel JACKSON was the Chairman and Managing Director, and Mr. C. J. BELL the General Manager.

Mr. COLEMAN did not stay long at Huddersfield, for in February, 1882, the position of Manager of Bradford again became vacant, and he was transferred there. About this time Mr. BELL resigned and Mr. J. C. CHAMBERS was appointed General Manager in his place. Mr. COLEMAN remained at Bradford till February, 1885, when it was decided to divide the district under Mr. CHAMBERS, and Mr. COLEMAN was appointed General Manager for the Midland Counties District, with headquarters at Birmingham. The Midland district of those days was a very different district to the Midland Province of to-day; the Nottingham and Sheffield districts were not included, and the National territory did not extend further south than Coventry and Leamington; North Wales was in the Lancashire and Cheshire Company's district. The only exchanges in the district were three small ones in Birmingham, and one each in Wolverhampton, Walsall, and Dudley. The Company had undertaken to open exchanges in the Potteries, but very little work had been done. Thus Mr. COLEMAN had a big title and not much else, except a general outlook over a large tract of country comprising a number of more or less important towns, where the Company considered exchanges should be opened, but where the principal business people insisted that a telephone exchange was useless!

The Town Councils were inclined to be antagonistic and were opposed to the erection of wires over the streets; they were just as anxious for underground wires then, when underground wires were impracticable, as they were opposed later, when the telephone was well established and underground work became a necessity. Mr. COLEMAN spent a good deal of time in interviewing town clerks

and councillors and addressing council meetings, as it was considered desirable before proceeding in any town to obtain a resolution of the Town Council approving of the opening of an exchange and promising support. When the resolution of the Town Council had been obtained the actual canvassing was begun; this was chiefly done by the General Manager, who also gave active supervision to the whole of the work and obtained many of the wayleaves. In those days Mr. COLEMAN designed the switchboards and made them in the Birmingham workshops. The opening of an exchange in the Midland district was then an important local function, some particulars of which may now be interesting.

A large public hall was engaged, and the Mayor was generally persuaded to take the chair; invitations were issued to the subscribers and to the more important people in the town and neighbourhood. The Mayor first of all received messages of congratulation from the Mayors of other towns. The public meeting followed; there was a speech by the Mayor, followed by the General Manager, who, after explaining the system and urging those who had not subscribed to do so, called on the Mayor to give the first call to the exchange, which was then declared open—"never to be closed." This was followed by light refreshments, and a telephone concert, given by the staff and others from various towns.

After the amalgamation of the various telephone companies Mr. COLEMAN was appointed Provincial Superintendent for the Midland Province, which consisted of the old district slightly enlarged.

Mr. COLEMAN has for years been associated with the advance guard of telephony; in the early years he was an indefatigable worker, mostly on the engineering side and later on he took up other questions with the same zeal. This is particularly true as regards underground plant and buildings. At a time when underground work was by no means as general as at present he persistently advocated it and secured many wayleave agreements from local authorities and he has maintained this position up to the present. In the same way as regards specially designed telephone buildings: Birmingham Central, designed by him, was, if not the earliest, at any rate, a conspicuously well planned building at the date of its erection; other buildings were afterwards erected at Nottingham, Hanley, Leicester, and Burton.

When the writer first knew Mr. COLEMAN in 1890 he had recently designed, in conjunction with Mr. H. JACKSON, a combined translator and clearing-out drop. Until then the translators in use had an open magnetic circuit, and it was not feasible to ring through them; later the closed magnetic circuit translator was brought out and the consequent possibility of multipling metallic junctions on a single wire switchboard drove the early translator out of the field. Mr. COLEMAN was also the designer of a test board which had a very considerable vogue: test jacks were fitted horizontally in rows of twenty, and wires either single or metallic were brought down at each side of the jacks, the arrangement of holes in the woodwork being such as to enable any wire to be got at easily in case of work on them being required. This board will be remembered by many readers of the JOURNAL. Mr. Coleman also designed the bell contacts on an indicator for subscribers' apparatus in which a tongue on the shutter is made to enter between two plates of metal when the shutter falls. In those days the manufacture of apparatus was not what it now is, and those responsible had, in many cases, to design and always to fit the plant they required in exchanges.

Mr. COLEMAN has always been a keen supporter of telephone societies, and was in fact the prime mover in one of the very first telephone societies in the United Kingdom. The writer has a very vivid recollection of his keenness and enthusiasm with regard to all matters relating to the telephone industry for a period extending over nearly seventeen years.

Outside telephone circles Mr. COLEMAN is best known as a church worker, more particularly in connection with Sunday schools; he has taken the greatest interest in this work for over thirty years. For eighteen years he was Superintendent of one of the largest Sunday schools in Birmingham, and during that time was twice elected President of the Birmingham Church of England Sunday School Association.

Mr. COLEMAN is an old Member of the Institution of Electrical Engineers, having joined what was then called the Society of Telegraph Engineers in 1880 as an Associate, and was made a Member in 1886. When a branch of the Institution was formed in Birmingham he was placed on the first committee and served three years. Mr. COLEMAN is a golf player, but his handicap runs into high figures and he is not a great frequenter of the links.

THE TELEPHONE *V.* CORRESPONDENCE.

BY HENRY ELLIOTT, *Manchester.*

"REALLY this correspondence is getting beyond all bounds. Something must be done to keep it down." Who has not heard the plaintive wail from the manager or the head of a department when he finds himself confronted by a huge pile of letters for signature? Much of it trivial stuff too. Acknowledging receipt of communications for instance, "as a matter of courtesy," and because it is "businesslike." Is it businesslike in these strenuous times to dictate a letter, have it typewritten, copied, addressed, stamped and posted in order to assure your correspondent that you have received his letter? He knows you have in all probability received it and if he does not get the reply he wants in a reasonable time will remind you of it, just the same as he would if you had acknowledged it. The probability is, too, if the matter is particularly urgent he will remind you of it by telephone, thus saving time and money, and getting to know promptly how the matter stands.

The idea of course is that we must have things in writing to cover ourselves in case of any dispute arising in the future; but of what real value is this when we consider that the production of evidence of a letter having been written and posted is, as a matter of fact, taken as presumptive evidence of the same having been duly received?

Assuming a case of sufficient importance to warrant the expenditure of time and money entailed by an acknowledgment, a few words by telephone would be quicker, far cheaper, and of infinitely greater satisfaction to your correspondent.

As to the importance of having things in writing, consider for a moment the thousands upon thousands of important transactions conducted by "word of mouth" daily throughout the country on the different exchanges and markets, and how rarely do we hear of disputes in connection with such transactions.

The writer was shown round the biggest cattle market in England quite recently, and was informed that all the buying and selling there was done by what was called "word of honour," and that disputes were unknown amongst the traders.

Consider also the big deals in cotton, stocks, etc., negotiated by telephone. No time to wait for anything so old-fashioned as correspondence by letter or telegram there.

How unbusinesslike it is, then, compared with this, to spend time and money in writing letters on trivial matters merely in order to "have it in writing," for no other purpose than to show in case of a dispute arising (and what a very remote contingency this is) that you are not the party who is to blame.

This habit appears to be growing in many big concerns, and the result is that, far in excess of the ratio of increase in business, there is a constant demand for increase in staff.

The "Universal Time Saver," the TELEPHONE, is to your hand. Here, then, is your remedy. Use it.

The *Commercial Handbook* says: "A careful calculation of all the various items of expense that enter into a business letter, including postage, stationery, time in dictating, time of typewriter, and so forth, shows that the average cost of a business letter is about 5*d*. The average cost of a telephone call, message and reply or acknowledgment complete, is . . . 1*d*. or less."

This applies not only to correspondence between different commercial houses, but also to inter-departmental correspondence in all big concerns.

"EMPTIES."

IN the paper on the above subject in our last issue, the word "Registration" in Figs. 1 and 2 should be "Requisition."

MR. BERNARD SHAW AND THE TELEPHONE.

THE connection of Mr. BERNARD SHAW, the distinguished dramatist, novelist, critic and publicist, with telephony is perhaps not very widely known, but in the preface to a recent edition of his novel *The Irrational Knot* there occur the following interesting remarks on the very early days of the telephone :—

This book is not wholly a compound of intuition and ignorance. Take for example the profession of my hero, an Irish-American electrical engineer. That was by no means a flight of fancy. For you must not suppose, because I am a man of letters, that I never tried to earn an honest living. I began trying to commit that sin against my nature when I was fifteen, and persevered, from youthful timidity and diffidence, until I was twenty-three. My last attempt was in 1879, when a Company was formed in London to exploit an ingenious invention by Mr. Thomas Alva Edison—a much too ingenious invention as it proved, being nothing less than a telephone of such stentorian efficiency that it bellowed your most private communications all over the house instead of whispering them with some sort of discretion. This was not what the British stockbroker wanted; so the company was soon merged in the National Telephone Company, after making a place for itself in the history of literature, quite unintentionally, by providing me with a job. Whilst the Edison Telephone Company lasted, it crowded the basement of a high pile of offices in Queen Victoria Street with American artificers. These deluded and romantic men gave me a glimpse of the skilled proletariat of the United States. They sang obsolete sentimental songs with genuine emotion; and their language was frightful even to an Irishman. They worked with a ferocious energy which was out of all proportion to the actual result achieved. Indomitably resolved to assert their republican manhood by taking no orders from a tall-hatted Englishman, whose stiff politeness covered his conviction that they were, relatively to himself, inferior and common persons, they insisted on being slave-driven with genuine American oaths by a genuine free and equal American foreman. They utterly despised the artfully slow British workman who did as little for his wages as he possibly could; never hurried himself; and had a deep reverence for any one whose pocket could be tapped by respectful behaviour. Need I add that they were contemptuously wondered at by this same British workman as a parcel of outlandish adult boys, who sweated themselves for their employer's benefit instead of looking after their own interests? They adored Mr. Edison as the greatest man of all time in every possible department of science, art and philosophy, and execrated Mr Graham Bell, the inventor of the rival telephone, as his Satanic adversary; but each of them had (or intended to have) on the brink of completion an improvement on the telephone, usually a new transmitter. They were free-souled creatures, excellent company, sensitive cheerful and profane; liars, braggarts and hustlers; with an air of making slow old England hum which never left them even when, as often happened, they were wrestling with difficulties of their own making, or struggling in no-thoroughfares from which they had to be retrieved like strayed sheep by Englishmen without imagination enough to go wrong,

In this environment I remained for some months. As I was interested in physics, and had read Tyndall and Helmholtz, besides having learnt something in Ireland through a fortunate friendship with a cousin of Mr. Graham Bell, who was also a chemist and physicist, I was, I believe, the only person in the entire establishment who knew the current scientific explanation of telephony; and as I soon struck up a friendship with our official lecturer—a Colchester man whose strong point was pre-scientific agriculture, I often discharged his duties for him in a manner which, I am persuaded, laid the foundation of Mr. Edison's London reputation; my sole reward being my boyish delight in the half-concealed incredulity of our visitors (who were convinced by the hoarsely startling utterances of the telephone that the speaker, alleged by me to be twenty miles away, was really using a speaking trumpet in the next room), and their obvious uncertainty, when the demonstration was over, as to whether they ought to tip me or not; a question they either decided in the negative or never decided at all, for I never got anything,

Upon this the *Electric World*, of New York, contains the following remarks by Mr. SAMUEL INSULL, President of the Chicago Edison Company :—

The ingenious telephone invention which Mr. Bernard Shaw refers to was Mr. Edison's "motograph receiver," otherwise known as the "loud-speaking telephone," and sometimes called the "chalk receiver" telephone. Some time in 1878, the Bell Telephone Company, of London, obtained an injunction which prevented Mr. Edison's English representatives from using the magneto receiver; and when Edison was telegraphed to with relation to the matter, his reply was that he would invent a new receiver. The Edison carbon transmitter patents for England were very good, but without a receiver nothing could have been done with them. When the new receiver came over either in February or March, 1879, it was in care of Mr. Charles Edison, a nephew of Mr. Thomas A. Edison, a very bright young man, who died unfortunately within a year in England. As a result of the advent of the loud-speaking receiver, the Edison Telephone Company of London was formed. I was not in the employ of this company, but was private secretary to the man who organised it, Colonel George E. Gouraud (who held Mr. Edison's power of attorney in England), and through him I came closely in contact with the company. I heard a great deal of the early negotiations leading up to its formation, and in the first experimental telephone exchange erected in Europe at 6, Lombard Street, early in 1879, I had the honour of being telephone operator for the first half-hour. My own impression is that this was the first exchange built by anybody outside the United States. I well remember taking a shorthand note of a meeting at which the Right Hon. E. P. Bouverie, who used to be one of Gladstone's Cabinet Ministers, Sir John Lubbock (now Lord Avebury), the distinguished scientist and banker, and a number of other men of relatively the same standing, were discussing the possible uses of the telephone. They were all at that time, or had been, prominent in political life. The only use they could see for the telephone was to report the fag ends of the Parliamentary debates in the small hours of the morning, so as to enable the London dailies to give the debate in full. No one in that party, at least, ever dreamt of its being the universal means of business and social communication that it is to-day. This Edison Telephone Company of London was finally consolidated either at the end of 1880 or early in 1881 with the Bell Telephone Company of London. The company was called the Edison-Bell Telephone Company. It was a few years later that the National Telephone Company was formed and absorbed the Edison-Bell Company.

This is not quite accurate. The Edison and Bell Companies were fused and became the United Telephone Company in 1880, which was amalgamated with the National Company in 1889. The Col. GOURAUD referred to was one of the directors of the old United Company. As therefore the Edison Telephone Company was one of the numerous companies which directly or indirectly were merged in the National, we can, without stretching the term too far, claim Mr. BERNARD SHAW as an ex-member of the staff.

FIVE YEARS' TELEPHONE DEVELOPMENT IN GERMANY.

SOME interesting figures appear in the second January issue of the *Archiv für Post und Telegraphie* showing the development of the telephone in Germany during the years 1901-5. We have already remarked in the JOURNAL that the development of this country closely approximates that of Germany, and the following figures show that the increase in stations in the two countries during the five years has been at about the same rate :—

GERMANY.

	End of 1900.	End of 1905.	Increase per cent.
Number of exchanges	2,423	5,234	116
Telephone stations	250,778	537,198	114

The annual number of connections made reached 1,000,000,000 for the first time in 1905, and the daily average was nearly 3,000,000.

The following figures are of interest as showing the development in this country during the same period. It should be borne in mind that the population of Germany as compared with that of Great Britain is, roughly, in the ratio of 5 to 4.

GREAT BRITAIN AND IRELAND.

	End of 1900.	End of 1905.
Number of stations, National Telephone Company	200,200	362,400
Post Office and corporations, approximately	1,500	62,400
	201,700	424,800

There were, of course, no corporation systems extant in 1900, and the Post Office had not yet opened any exchanges in London.

During the period under review the number of stations in Berlin increased from 48,000 to 77,000, and in Hamburg from 19,000 to 32,000.

The central battery system has been installed in Bremen, Stettin, Brunswick, Crefeld, Mannheim, Breslau, Plauen (Saxony), Erfurt, Wiesbaden, Leipzig, and two of the Berlin exchanges.

TIDINGS FROM BUENOS AYRES.

Mr. C. W. GWYTHER, who used to be in the Company's service and is known to many, has been recently heard from. He is now assistant manager to the United River Plate Telephone Company, at Buenos Ayres, who, he says, are very full of work. They have recently opened the first Central Battery Exchange in the Libertad section of the city. This has equipment for 3,000 subscribers' lines, and an ultimate capacity of 9,600; there are in addition two other central battery exchanges in hand, "Mitre" to be equipped for 2,300 and "Juncal" for 3,000 subscribers

With regard to line work in the heart of the city, their method is to have a distributor in every four blocks as a rule. Where more than five circuits cross a street overhead cables of small size run to block distributors, and from these the subscribers' lines are run in No 16 hard drawn copper vulcanised india-rubber covered twisted pair, through enamelled rings screwed into the walls of the houses.

Mr. Gwyther sends greetings to all his old friends.

THE TELEPHONE OPERATOR AT SCHOOL.

BY W. M. FRANCE, *Head Office*, and J. F. EDMONDS, *Metropolitan Traffic Manager*.

(*Continued from p.* 231.)

It will readily be seen that with the apparatus provided, all operating conditions can be represented. Each section of three positions of the subscribers' switchboards represents a separate exchange, and the calling monitor in charge of the three learners sitting immediately in front of her passes calls to them by means of the 30 lines provided. She represents the subscriber to the learner and makes imaginary calls, either local or junction. Generally speaking, these calls are made back to themselves and the call is answered with the fellow cord and plug to that used when passing the call, but this is not essential, and calls may be passed from one calling monitor to another. Junction calls of all classes may be originated and completed by the operators on the call wire or ringing junctions provided.

Before describing the course of tuition it may be advisable to touch on the steps taken to eliminate unsuitable applicants. The would-be operator (1) makes application by letter, (2) gives

FIG. 7.—THE CANDIDATES' EXAMINATION ROOM.

necessary particulars on an application form, (3) interviews the examining matron, (4) is educationally examined, and (5) is medically examined. During the first three stages she is considered as an "applicant," the last two as a "candidate," and is finally engaged for the school as a "learner." At each of these points, the elimination of unsuitable material goes on to such an extent that the learners engaged for the school in London only represent 11 per cent. of the applications dealt with. The success of the operating school will, of course, largely depend on the quality of the learners drafted into it, and the greatest care is needed in their selection.

The course of tuition is planned to cover a period of five weeks, and the students are divided into five classes or grades. The first four weeks are spent entirely at the school, but during the last week, the students in addition to doing practical work on the school switchboards, are sent to the exchanges to which they will be drafted to learn the local conditions and to listen on "A" and "B" operators' head sets. The work of each class is broadly divided every day into four parts, consisting of a lecture, study and oral examination, practice, and a test paper. The lectures, of which there is a series of twenty, are held in the lecture room, and each class attends one of them every day except on Saturdays. The classes for oral examination and study on the preceding lecture are held in the study room. Instruction in practical operating takes place in the switchroom under the superintendence of the calling monitors and supervisors, and lastly the test papers are given in the examination room. As the arrangement of a time table for these

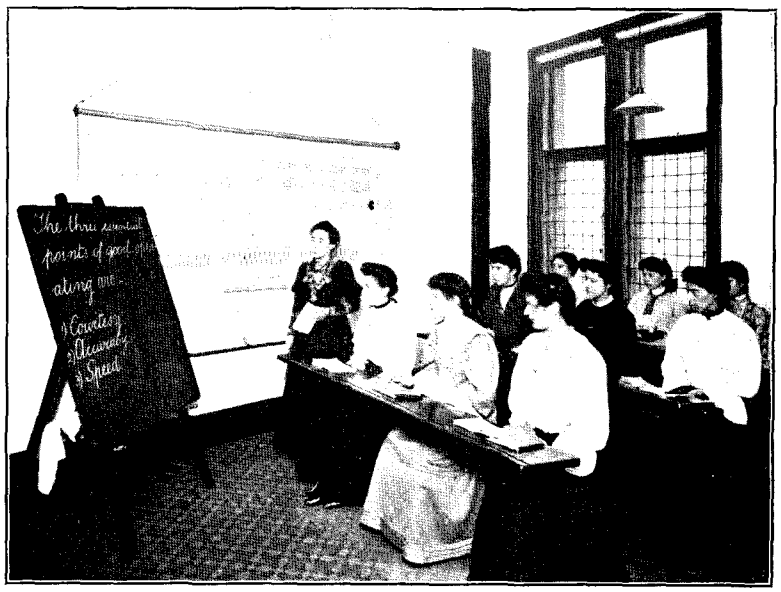

FIG. 8.—THE LECTURE ROOM.

four classes of work amongst the various grades of learners presented some difficulty in order to prevent any overlapping, it may be of interest to show a sample of that drawn up for the London school.

The school is under the charge of a head school-mistress, officially known as the operating school clerk-in-charge. She has a staff of ten assistants, divided up as follows:—

Four calling monitors.
Five supervisors and lecturers.
One information monitor.

When a candidate has successfully passed through all the preliminary stages referred to above, she is given a number which

FIG. 9.—THE STUDY ROOM.

she retains during her school days, and the clerk-in-charge has a general talk with her, showing her the cloakroom, and locker allotted to her, the sitting and retiring-rooms, and the dining-room, where meals are provided on the company's premises. The

LONDON OPERATING SCHOOL.

Time Table of Lectures, Study, and Practical Work based on Five Weeks' Period of Tuition.

CLASS 1.—FIRST WEEK'S COURSE.

	Morning.		Afternoon.	
	First Part.	*Second Part.*	*First Part.*	*Second Part.*
Friday	Lecture 1.	Study and Oral Examination.	Elementary Practice.	Study and Oral Examination.
Saturday	Listening.	Test Paper 1.		
Monday	Lecture 2.	Study and Oral Examination.	Elementary Practice.	Test Paper 2.
Tuesday	Lecture 3.	Study and Oral Examination.	Elementary Practice.	Test Paper 3.
Wednesday	Lecture 4.	Study and Oral Examination.	Elementary Practice.	Test Paper 4. [Lectures 1 to 5.
Thursday	Lecture 5.	Study and Oral Examination.	Elementary Practice.	Study and Oral Examination,

CLASS 2.—SECOND WEEK'S COURSE.

Friday	Test Paper 5.	Lecture 6.	Study and Oral Examination.	Practice.
Saturday	Practice.	Practice.		
Monday	Test Paper 6.	Lecture 7.	Study and Oral Examination.	Practice.
Tuesday	Test Paper 7.	Lecture 8.	Study and Oral Examination.	Practice.
Wednesday	Test Paper 8.	Lecture 9.	Study and Oral Examination.	Practice.
Thursday	Test Paper 9.	Lecture 10.	Study and Oral Examination.	Practice.

CLASS 3.—THIRD WEEK'S COURSE.

Friday	Practice.	Test Paper 10.	Lecture 11.	Study and Oral Examination.
Saturday	Study and Oral Examination, Lectures 1 to 10.	Study and Oral Examination, Lectures 1 to 10.		
Monday	Practice.	Test Paper 11.	Lecture 12.	Study and Oral Examination.
Tuesday	Practice.	Test Paper 12.	Lecture 13.	Study and Oral Examination.
Wednesday	Practice.	Test Paper 13.	Lecture 14.	Study and Oral Examination.
Thursday	Practice.	Test Paper 14.	Lecture 15.	Study and Oral Examination.

CLASS 4.—FOURTH WEEK'S COURSE.

Friday	Study and Oral Examination, Lectures 1 to 15.	Practice, Lectures 6 to 8.	Test Paper 15.	Lecture 16.
Saturday	Visit to Exchanges.	Visit to Exchanges.		
Monday	Study and Oral Examination.	Practice, Lectures 9 to 11.	Test Paper 16.	Lecture 17.
Tuesday	Study and Oral Examination.	Practice, Lectures 12 to 15.	Test Paper 17.	Lecture 18.
Wednesday	Study and Oral Examination.	Practice.	Test Paper 18.	Lecture 19.
Thursday	Study and Oral Examination.	Practice.	Test Paper 19.	Lecture 20.

CLASS 5.—FIFTH WEEK'S COURSE.

Learners listen on "A" and "B" operators' head sets, act as relief operators during slack hours, and acquire a local knowledge of the exchanges to which they will ultimately be drafted, except during the times specified below when they are required at the Operating School for practice.

FIG. 10.

student then attends her first lecture, and is well on the way to become an efficient telephone operator.

It is a somewhat difficult matter for a traffic manager, to whom the technicalities of operating become almost second nature, to draw up lectures in such a way that the natural sequence of operations is as far as posible maintained; and it must always be borne in mind by the lecturers that the new student knows nothing whatever of telephone operating. Care must therefore be exercised not to confuse her by references to operations or apparatus dealt with subsequently.

The series of lectures drawn up forms such an important part of school tuition that the heading of each is given below, with some short notes on the ground covered.

(1) *Introductory.*—The student has explained to her the extent of the Metropolitan telephone area; origin of exchange names and codes; correct repetition of numbers; method of doubling; correct articulation of numbers; and the usual errors made.

(2) *Parts of a Telephone and of a Central Battery Subscribe s' Section.*—Although no attempt is made to instruct operators in the electrical circuits of telephone apparatus, they have explained to them the apparatus at the subscribers' end as well as in the exchange, this making them understand more intelligently a telephone connection.

(3) *Central Battery System.*—General elementary description of the method of operating.

(4) *Magneto System.* Parts of a subscriber's section and general method of operating.

(5) *The Three Cardinal Points of a Good Service.*—(1) Politeness. (2) accuracy, and (3) speed; necessity for good temper, tact and discretion. Subscribers to be instilled with confidence in the telephone, secrecy, punctuality, care of instruments, and various other instructions in telephone manners and correct attitude to Company and public.

(6) *The Effective Local Call.*—Points of importance, such as holding a plug in readiness to answer a call, team work, and expressions to be used, are explained.

(This lecture is dealt with more fully, as an illustration, in a later part of this article.)

(7) *The Ineffective Local Call.*—Reasons for local calls being rendered ineffective due to subscriber engaged. no reply, or out of order. Expressions to be used, and how to deal with such calls.

(8) *The Monitorial System.*—The relation of the operator to the monitor, and how the latter assists the former in any difficulties that may arise.

(9 and 10) *Effective and Ineffective Junction Calls*—Methods of effecting junction connections over direct or borrowed ju ctions by means of ringing junctions or those worked by order wire.

(11, 12, 13 and 14) *Services, Facilities and Registration of Calls.*—Subscribers divided into classes, flat rate, message rate. and party line; call offices into automatic, pay, and attendant. Definitions. Trunk and telegram calls Postal facilities. The various markings of the subscribers' calling lamp caps, known as "The Opal Code." Assistance of mnemonics as aid to memory. Electrophone facilities.

(15) *Miscellaneous Duties of Operators.*—Evening buzzer and night bell. Distribution of subscribers who make night calls. Fire calls. Fire drills.

(16 and 17) *Parts of Central Battery and Magneto B or Junction Positions.*—General method of operating.

(18 and 19) *Effective and Ineffective Junction Operating by "B" Operators.*

(20) *Records.*—The last lecture is devoted to instructing the student operators in important points in the taking of load lines and special records.

The students are very materially assisted during the lectures by means of large charts which are referred to from time to time by the lecturer, and in Fig. 11 is shown a sample of those in use. One is also to be seen on the wall of the lecture room in Fig. 8.

The possibilities of the apparatus and tuition can only be fully

appreciated when detail is considered; and this is well illustrated by an analysis of Lecture 6, the study and oral examination, the practical work and test paper which follow. This particular lecture has been chosen because the general rules which apply to the completion of a simple local call will be understood by the majority of those who deal with operating and traffic matters, and is not complicated by particular methods of junction working and the special features of the monitorial system, which may, to a great extent be peculiar to the Metropolis.

The lecture itself, which occupies the latter part of the morning of the second Friday of tuition—as seen from the time table, embraces the following points:—

Operators to anticipate calls by holding answering plug in one hand, with listening key in listening position.

Team work in answering and disconnecting. Number of operators composing a team. Team work between teams. Speed of answer tests.

Subscribers' lines not to be plugged up when answering calls. Calls to be answered from local jacks unless team work is in operation.

Expression to be used when answering a call. Subscriber must

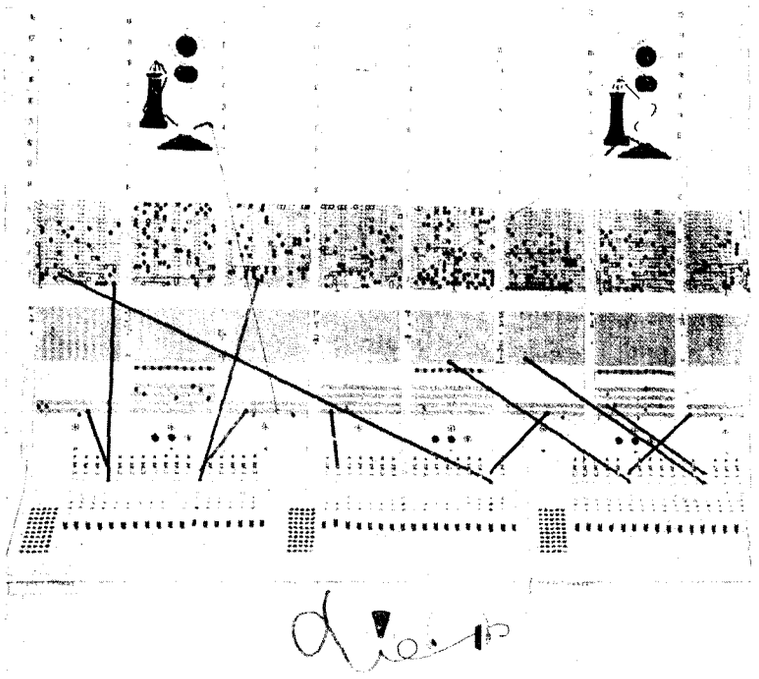

FIG. 11.—CHART OF TYPICAL COMMON BATTERY SUBSCRIBERS' SECTION.

give name of exchange as well as number. Reasons for repeating calls back to subscribers. Subscribers to be encouraged to give name of exchange before number, and to repeat numbers correctly, by operators repeating back in the orthodox way. Subscribers not to be rung back either when their calls are answered or after calls have once been taken.

Testing a local subscriber's circuit on multiple. Correct method of ringing. Reason why jerky ringing is prohibited. Fellow cords to be used in establishing a connection. Responsibilty of operators for seeing calls through.

Difference between supervising a call at a common battery exchange compared with that of a magneto exchange. Operator must leave cord circuit once communication has been established. Care to be taken not to ring called subscriber after conversation has commenced.

Disconnection by double lamp clear at common battery exchanges. Disconnection by ring-off indicator; no necessity for tapping. Plugs not to be pulled out by the cords in disconnecting. Plugs to be guided back to their sockets.

Intermittent flashing of supervisory signals. Meaning from a subscriber's point of view: (1) Fresh call. (2) Trouble on existing calls.

Flashing supervisory signals takes precedence over answering line signals. Expression to be used when answering flash calls.

What to do if either subscriber is in trouble with regard to call or wishes to originate a fresh call. Education of subscribers as regards flashing.

Importance of depressing register key before disconnection or after calling subscriber flashes for fresh call.

Local calls for subscribers who have auxiliary lines. How auxiliary lines are marked.

Local calls for subscribers whose lines are pegged up with local changed number pegs. Necessity for advising caller of change.

Local calls for subscribers whose lines are pegged up with out-of-order pegs.

Local calls for pay call offices. The meaning of such calls. Terminal fee required for receiving such calls.

Use of both hands in operating.

After this lecture has been given, learners go into the study room. Here the supervisor refers them to the rules in their rule books which relate to the points dealt with in the preceding lecture, and which the learners are expected to learn. Shortly before the class ends, the learners are examined *viva voce*. Instructions not covered by existing rules in the rule book are explained and amplified, and learners are encouraged to ask questions at every stage.

Then follows the practice, which it will be noticed from the time table in this case lasts three quarters of a day. It is exactly at this stage that learners begin their real study of practical operating. Calling monitors and supervisors have to be on the alert, and too much importance cannot be given to the fact that irregularities of whatever nature must be stopped, and must not be allowed to go by unchallenged. If this is not done at this initial stage, wrong expressions and wrong methods of operating will creep in, which it will be very difficult to subsequently efface. It is obvious that certain things can best be supervised by the calling monitor, whilst others come best under the control of the supervisor.

The calling monitor, to begin with, makes the simplest kind of local call back to herself by asking for a number which terminates on her desk. In this case, she is the best judge as to whether the learner

(1) Uses the correct expression in answering.
(2) Repeats the call back in the orthodox manner.
(3) Rings in a proper manner.
(4) Understands flash signals and uses the correct expressions and procedure.
(5) Registers correctly against caller, before clearing a connection or after a flash signal for a fresh call.

It may be mentioned that the calling monitor can give a flash signal by moving her plug in and out of the jack she is using, corresponding to a subscriber moving his switch-hook up and down.

The supervisor, on the other hand, sees that the learner

(1) Anticipates calls.
(2) Does team work.
(3) Does not plug up lines and answers from local jack, unless team work is in operation.
(4) Uses the fellow cord and tests multiple jack before inserting plug.
(5) Supervises entirely by visual supervision on the common battery section and enters the cord circuit on magneto section.
(6) Disconnects promptly after registering.
(7) Uses the plugs and cords correctly.
(8) Answers flash signals promptly.
(9) Uses both hands in operating.

Team work can be tested by the calling monitor making two calls simultaneously on one position.

The calling monitor now makes a local call for a subscriber who has auxiliary lines, previously having made the first of the auxiliary lines to test engaged.

The calling monitor then originates a call for a subscriber transferred to another number working on her position, and notes the learner's advice to her. She then originates a call for a subscriber whose line is temporarily out of order, and whose temporary number works on her desk.

It is the business of the calling monitor to give a fair share of

work to each of her learners, and after she is satisfied that the details are mastered she may adopt speed.

Finally a test set of questions is given. By way of illustration one of the sets in use for examining the learners in the work just described is quoted below:

Test Paper 6.

(1) Describe what is meant by team work. How far does it exist in disconnection?

(2) A subscriber asks for "Three hundred and sixty-six Hampstead." How would you repeat this call back to him?

(3) What precaution must you take with plugs and cords in disconnection?

(4) Why is it more important to attend to a flashing supervisory signal than a line signal? Describe what you would do and

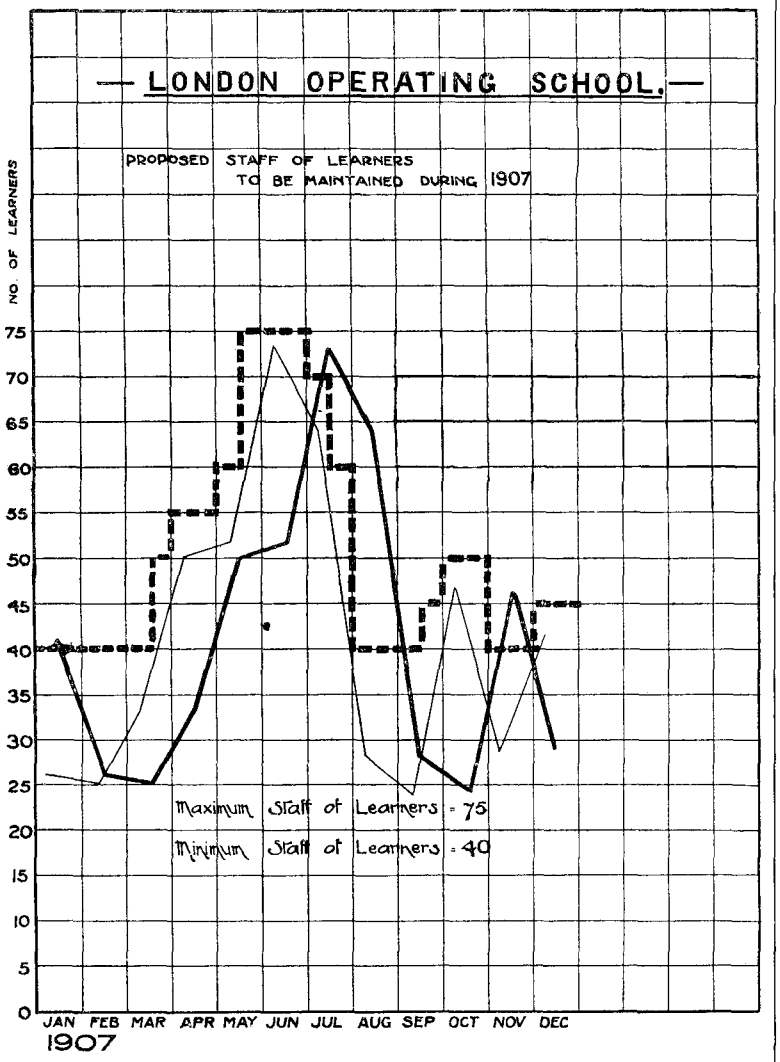

FIG. 12.—CURVE OF ANTICIPATED VACANCIES.

——— Vacancies to be filled owing to new staff sanctioned and resignations during 1906 (and part 1905).

– – – – Same curve brought forward—allowing a period of five weeks for tuition.

▪ ▪ ▪ Practical curve making allowance for a minimum number of 40 learners (for 1907) and percentage increase in additional staff required.

what expressions you would use if trouble was experienced or a fresh call was required.

(5) What is meant by auxiliary lines, and how are they marked?

(6) What is the correct method of ringing?

An important consideration for the traffic manager is the maintenance in the school of the most economical number of students to meet the requirements of the area to be served. It has been found in London that there are two distinctly recurring periods of the year during which the largest number of vacancies occur, viz., during the summer months of July and August, and again during November. As it would be obviously inefficient to maintain the same number of learners in the school throughout the year, a forecast is made of the anticipated requirements a year ahead, and a curve plotted, with the object of showing the varying numbers of students to be drafted into the school month by month. This is shown in Fig. 12.

It will be seen that the curve of anticipated vacancies to be filled is plotted in the heavy full line. This same curve is then brought forward in the thin full line five weeks to allow for the period of tuition. On this is drawn a practical curve shown in the dotted line which allows for a minimum and maximum number of students, and varying numbers at different times of the year.

The importance of adopting well and carefully thought out methods of tuition cannot but be realised when it is remembered that in a comparatively short time the students from the operating school will leaven the whole operating staff of a district; and it is certain that any good or bad features in the training will quickly reflect on the service. The *personality* of the operator, in its relation to the telephone public, is a factor to be carefully considered, and as it is in the operating school that first impressions are received, too much care cannot be exercised by those responsible for the training and tuition to impart the right "tone" to the future operating staff.

ELECTROPHONE WORKING; OR, MUSIC BY TELEPHONE.

BY GEORGE K. PRATT.

THE telephone has been and is being applied to many purposes, though now mainly utilised for the transmission of speech; its first use, however, was for the transmission of music.

It was about the year 1861 that the first record of a telephone concert occurs; this was accomplished by PHILIP REIS, a German inventor, who invented an apparatus which by the aid of an electric current would transmit music, but not articulate speech.

Now with the hundreds of thousands of telephones in use at the present time, which have become a business necessity, it has been a problem with the Traffic Department what to do with its plant, which becomes idle at certain periods of the day while the cost of maintenance still goes on.

It was this question which led up to the introduction of what we call the "Electrophone" (to distinguish it from our ordinary telephone service), whereby the junctions and subscribers' lines, lying almost idle after the traffic of the day is done might be utilised.

In addition to the regular telephone lines, private lines are run direct into the "Electrophone" exchange, also party lines for non-telephone subscribers from which taps are taken to a number of residences and to these places is transmitted from the "Electrophone" exchange music, etc., from the various places of amusement to which we are connected.

It is about twelve years since the Company decided to introduce to its London subscribers the transmission of performances and music from the various theatres over its telephone lines.

During the first year there were only 47 subscribers to the special service, to-day the total number is about 600.

At present we have about 250 miles of church and theatre lines, connected to no less than fifteen churches and the same number of theatres and halls and others are now being added.

Endeavours have been made to obtain permission to place electrophone apparatus in the Houses of Parliament and Westminster Abbey, but up to the present without success.

Sometime ago, with the assistance of the Post Office officials, we very successfully transmitted, in addition to vocal and instrumental music, political speeches over a distance of 220 miles, when every word was taken down *verbatim* and reported by the Press, and papers were on the streets for sale a few minutes after the meetings.

On these occassions special precautions were taken to guard against a breakdown of the transmitting apparatus. In front and at each side of the speaker were placed transmitters

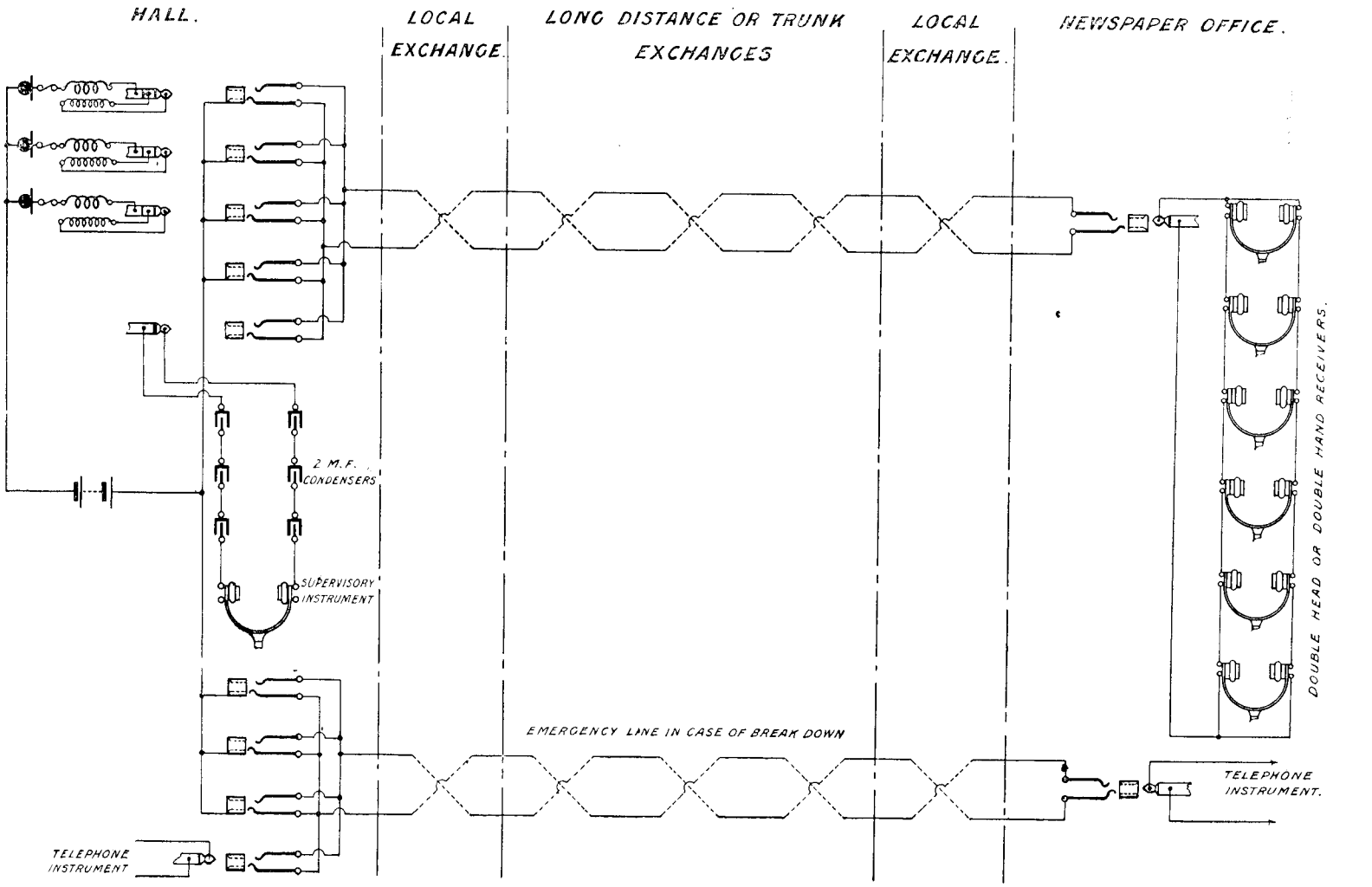

FIG. 1.

wired to induction coils, the secondary of which, together with one side of the primary, was connected to three-way plugs and cords, the other side of the primary being connected to a strip of multiple jacks, as shown in Fig. 1, so that the primary and secondary were connected and disconnected at one and the same time.

Constant supervision was given these lines by an attendant whose listening apparatus was bridged across the circuit with three condensers on each side wired up in series, so that should any one of the transmitters become faulty the plugs could be withdrawn one at a time until the faulty transmitter was located and another substituted in its place.

Within the last few weeks Grand Opera at Covent Garden has been transmitted to their Majesties at Sandringham over 200 miles of wire, the hearings being most satisfactorily received. London Church Services were also listened to by Her Majesty on a Sunday when the sermons were received with perfect distinctness and without the loss of a word.

The first hearing given their Majesties was rather premature, for it was whilst we were making tests to see if satisfactory service could be given to Sandringham that Sir Dighton Probyn ordered the apparatus to be taken into the library for the King to hear Madame Melba singing in *La Boheme*. This was no easy task, for the distance the apparatus had to be taken was about 200 yards. But it was not a question of "can it be done?" but "do it, and do it well"; so the necessary wire was quickly run, the apparatus connected up, and His Majesty was listening to the famous opera in about three minutes after the command was received.

The delight expressed by His Majesty and his guests at the distinctness of the hearing settled the question as to whether or not a satisfactory service could be given.

On the following Sunday morning, as I was making further tests, you may imagine my surprise when certain members of the household, who were listening at the time, quickly laid down their receivers and retired, leaving me alone with Her Majesty the Queen and Princess Victoria who had just entered and desired to listen to some of the Church Services.

At the "Electrophone Central Office" there are employed about one dozen female operators whose duty it is to connect outlying exchanges and subscribers' lines working direct into the "Electrophone" exchange to theatre lines when desired. Constant supervision is given to these lines by the operators, so that should a breakdown occur at any time in any portion of the circuit, the line would be immediately changed before any inconvenience was experienced by the subscribers.

At outlying exchanges where we get more subscribers than we have junctions available for "Electrophone" working, distributing boards are fitted at which several subscribers' lines can be connected to one music junction.

At these exchanges the local operator attends direct to the subscribers' wants, tapping the line from time to time so that if one of the subscribers' lines goes out of order during the hearing, arrangements can be made to disconnect that line, and thus avoid upsetting the hearing of other subscribers connected on the same distribution.

With regard to the service, we have limited and unlimited service for private residences connected to our system.

Special rates are charged for residential flats, clubs, *cafés*, hotels, and for temporary hearings. Party line service for non-telephone subscribers is now being given, whereby the use of condensers or a specially designed repeating coil enables twenty or more subscribers, working on one line with not less than two receivers each, to be served from one theatre line.

The condensers or repeating coils fitted at each subscriber's station permit transmission through the main circuit without interruption should trouble occur at any one station working on the circuit.

The equipment at the theatre for each line consists of one "Electrophone" transmitter, which is constructed with two carbon buttons supported on springs mounted on an ebonite button. The carbon buttons are surmounted and insulated from each other with soft wool to hold the granular carbon, which does not impede the movements of the diaphragm. The carbon buttons are made adjustable by means of the screw-threaded ebonite ring on which they are mounted. To prevent packing, the transmitter is mounted on a metal support having two springs at the back which make sliding contact on the metal rings projecting from the centre of the ebonite, by means of which the transmitter can be manually turned round, and the whole parts being rotated, the granular carbon is stirred up and falls into proper position in their containing chambers. Then we have an induction coil with a primary winding of $1\frac{1}{2}$ ohms resistance and a secondary winding of 150 ohms resistance, and a battery, consisting of two type T11 storage cells, from which several transmitters are worked.

Throwing the battery in and out of circuit is done from the exchange by sending momentarily over the switch-line a strong current. The induction coil on the first line is brought into use for this purpose, and acts both as an automatic switch and an induction coil. It is fitted with a specially constructed armature (see

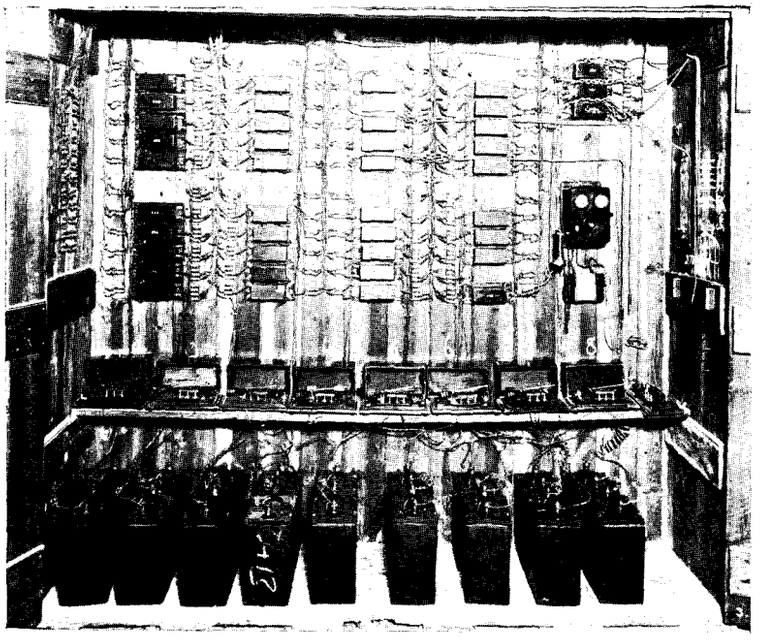

FIG. 2

Fig. 3) which upon a current being sent over the lines through the secondary of the coil is drawn smartly down, and striking between the teeth of the ratchet wheel, causes it to revolve at every stroke of the armature to an "on" or "off" position, every other tooth of the wheel being insulated.

The first transmitter used for "Electrophone" purposes was the "Blake"; then a multiple electrode transmitter, called the "Ader," with a thin piece of pinewood for its diaphragm. Whilst the quality of these transmitters was good, they lacked power, and trouble was experienced when they were subjected to loud music, as then they would rattle or entirely break the circuit.

It was therefore decided to use a granular carbon transmitter, and tests were made with transmitters manufactured by all the well-known makers, but not until we constructed one of our own did we get the satisfaction desired.

With this transmitter little trouble has been experienced, whilst others gave out quickly owing to the heat generated by the current (which is constantly on for about four hours each night) and the heat from the footlights, near which the transmitters are placed.

It might be mentioned that experiments have been made with a view to centralising the power, and removing the batteries from the theatres, thus saving cost of battery maintenance at these places, but this course was found unsatisfactory for "Electrophone" working.

The question of charging accumulators at the theatres direct

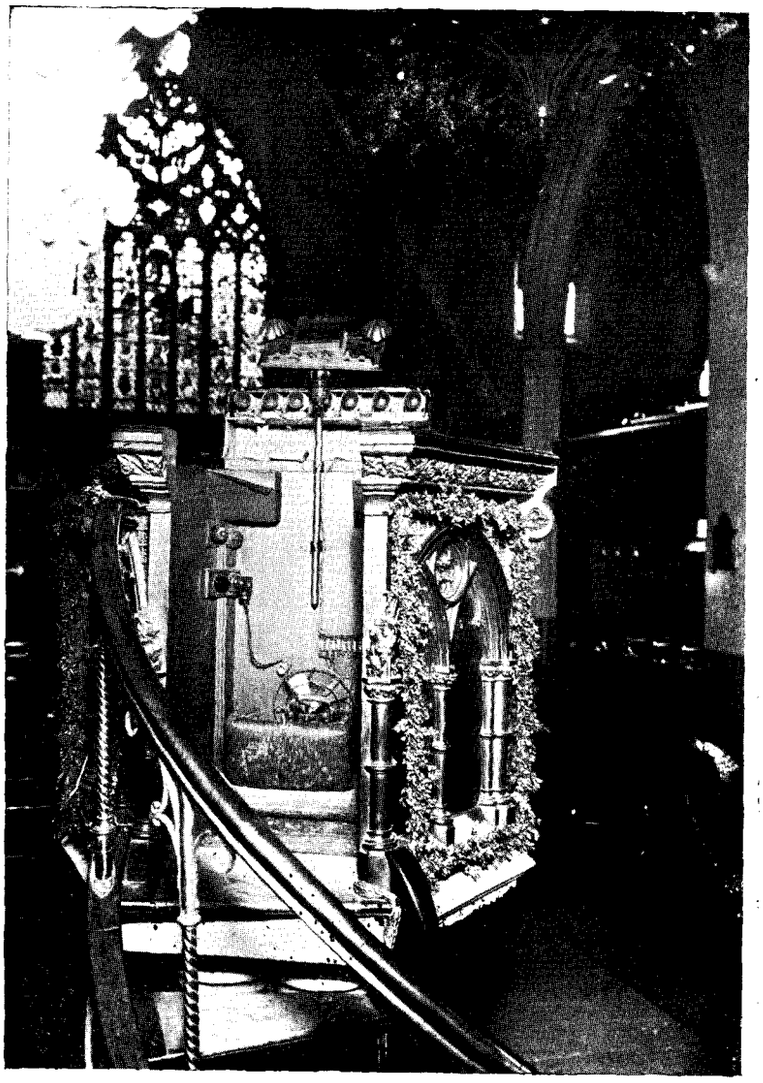

FIG. 3.—CHURCH INSTALLATION.

from the electric light service was considered, but found to be more expensive than our present system of charging them at the exchange and carting them to the theatres as required. All theatre lines coming into the "Electrophone" exchange terminate on break jacks, and are multipled at every other panel throughout the

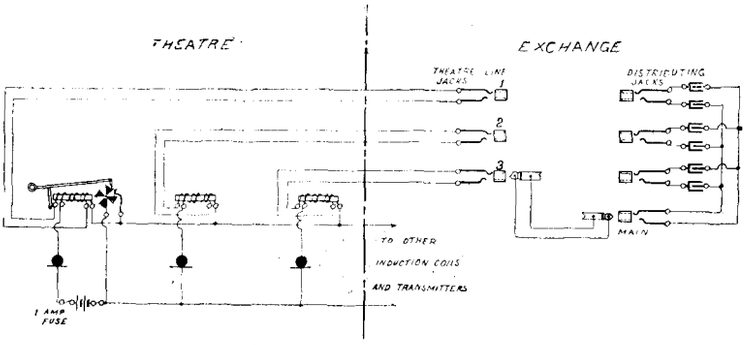

FIG. 4.—THEATRE LINE.

switchboard. When it is necessary to connect several subscribers to one theatre line, connection is made from the theatre jack to a set of distributing jacks with a double flexible cord having plugs at

each end (see Fig. 4). The distributing jacks are connected up in multiple with a 2 microfarad condenser connected on the "A" and "B" side of each jack.

The theatre line, operator's cord, and subscribers' circuits are shown in Figs. 4, 6 and 7, and the mode of operating is as follows:—

A subscriber desiring electrophone service signals the telephone exchange. The local operator then notifies the electrophone operator on the call wire, a junction is assigned, and the subscriber's line connected to it by a pair of flexible cords with plugs at each end. The subscriber is then connected to theatre desired.

Should he desire to change the hearing or use the telephone, he signals the operator from the electrophone table, or from the telephone; if from the table he presses the spring of the hand transmitter which closes the primary circuit and puts the "A" and "B" line to earth. A current then flows from the 22-volt battery

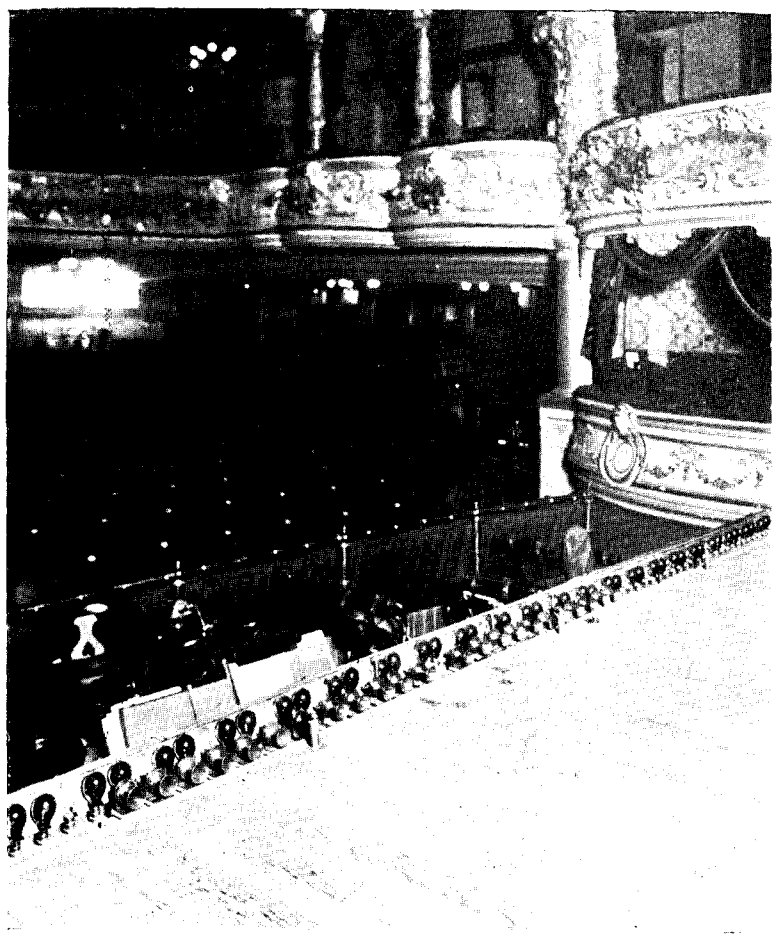

FIG. 5.—THEATRE INSTALLATION.

at the exchange through the winding of relay, through the grid indicator to the tubular drop-out on to the "A" and "B" line to subscriber's station, through the secondary of induction coil to earth back to battery. This operation causes the grid indicator to drop and the relay to close, throwing in circuit the supervisory lamp worked on a 4-volt battery. Should the subscriber signal from his telephone, he would after turning his switch from point marked "Electrophone" to point marked "Exchange," ring in the usual way, dropping the shutter of the tubular drop.

For an ideal electrophone service the following requirements should be considered:—

It is essential to have a good variety of both instrumental and vocal music to offer to avoid monotony, as people don't want to *listen* to performing dogs, bears or elephants.

In the operating promptness in answering is requisite—for a delay might mean a subscriber's missing a song which he particularly desired to hear.

So also is courtesy from operators, for a little more attention is expected by subscribers when using the electrophone than is desired when hustling for business on the telephone.

Freedom from mistakes in connecting the theatre desired is another requisite, as it must be very annoying for a subscriber after listening for some time to discover he has been connected to a Salvation Army meeting instead of the Gaiety.

There must be proper supervision of lines by the operator, to

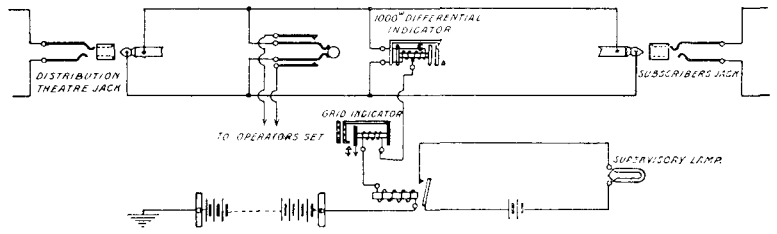

FIG. 6.

ascertain that no breakdown has occurred, that the lines and junctions are kept free from noise, and that the hearing is satisfactory.

Inspectors should be quite familiar with the apparatus they have to handle, and be able to repair any defect without delay.

Frequent inspections should be made, when both receivers and signalling apparatus should be carefully tested, and apparatus kept in first-class working order.

Before installing electrophone apparatus, lines should be carefully tested to see that they are fit for electrophone working, and that no difficulty is experienced owing to their running through trees, etc. No trouble is more detrimental to good electrophone working than the "earth," or "escape"; whilst it helps us in its

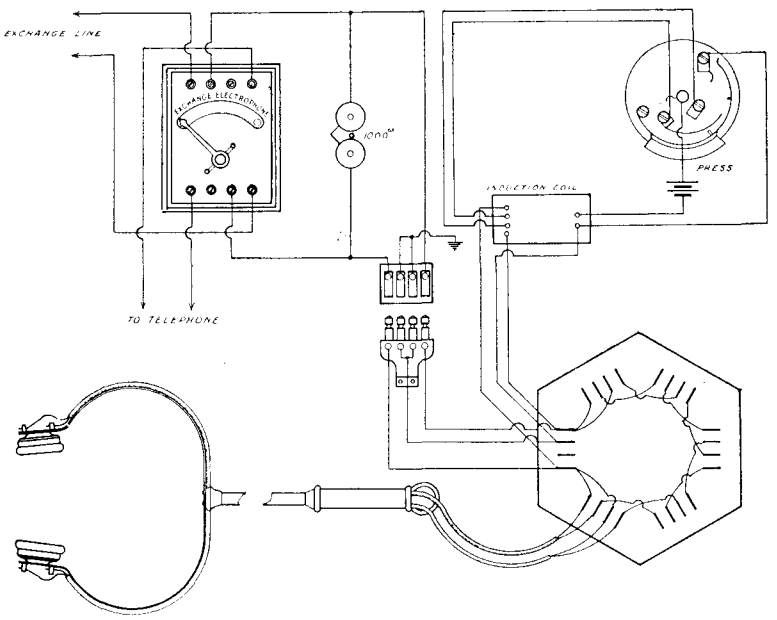

FIG. 7.

proper place, it becomes a nuisance when it throws a little of its own in, where it is not wanted, and which we can very well do without.

And last but not least, a loud receiver or transmitter is to be desired that will enable us to throw out in a room the music and dialogue so that everyone might hear distinctly without having to place receivers to their ears; also an invention capable of transmitting scenes from the theatre to a distance. This as yet is only a dream, yet after what we have seen we cannot but regard it as something which will be realised sooner or later.

MONTHLY RETURNS.—II.

BY W. BARNETT.

IN the September number of the JOURNAL I endeavoured to explain the *modus operandi* in regard to the returns dealing with the "expenditure" of the Company, and in this paper I purpose considering those relating to the "revenue" of the Company.

The telephone service being essentially a "prepaid" service, special steps have to be taken month by month, to allocate to each period, that is to say, to each month and eventually to each half-year, the proportion of revenue actually accrued or earned in respect of these periods. This we call "allocation of rentals."

It was with words similar to the above that Mr. ANNS greeted the writer fresh from a large shipping office, on his entering the service some fourteen years ago.

The annual rentals then did not exceed £600,000 and the fees £4,000 per month, as compared with £2,150,000 and £25,000 respectively at the present day.

The revenue is divided into two classses:

1. Rentals and fees.
2. Profit on sales.

The information in respect of rentals as now supplied to Head Office monthly by each centre, is given on the 1009 Form. This form contains 31 money columns—one column for each day of the month. Two forms are used, one for exchange line rentals and the other for "A" to "B" and "private" rentals.

Every amount due for the month, as shown in the Rental Register, is entered in one or other of the columns on these two forms, and the total of same is agreed with the total due for the month, as per the Rental Registers.

Should there be any rentals due in respect of periods other than for a complete twelve months, they are shown on a subsidiary 1009 Form, under "exchange" or "private" as the case may be, with particulars of the actual period covered and the annual rental.

The total of each of these forms is transferred to the "due" column of the return called the "No. 2 Summary." The total received during the month is entered in the "received" column, and the balance represents the outstandings as at the end of the month.

The outstandings are shown in detail the following month on the No. 2 Return. Amounts "received" or "written off" during that month are shown under their respective headings, and the totals of the columns entered on the No. 2 Summary. The total amounts "due" and "received" for the various classes of fees for the month also appear on the latter return.

A complete monthly summary of the rentals and fees "due," "received," "written off" and "outstanding," is thus obtained for each centre.

On arriving at Head Office the returns undergo a systematic check as regards the cast, outstandings from previous month, amounts with solicitors, and amounts to be written off, etc.

The total of each column of the 1009 Form from the 1st to 31st is then entered on allocation sheets ruled with a date column, a total column and money columns for thirteen months. All rentals due on, say, Jan. 1, are divided into twelve equal proportions from January to December; those due after the 1st are divided *pro rata* between January this year and January of next year, the intervening eleven months each receiving their one-twelfth share.

When the rentals have all been worked out in this way, each centre being kept separately, the amounts written off as per the No. 2 Return are then entered in red ink on the sheets and allocated in the same way and deducted from the rentals, but as the periods covered by the amounts written off date back as a rule, the current month has to bear the proportion for the past periods. For instance, a rental due June 1 and written off in the following January would have to be allocated eight-twelfths to January and the other four twelfths from February to May. After the fees as per No. 2 Summary are added to the sheets and allocated to the current month, a total is made, and the sheets for each centre are then posted to an "A" Book, which is ruled as follows:—

Name of Centre.	Total.	Jan.	Feb.	March	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
99 Centres														
Total ..														

When this book has been agreed, the total represents the rentals and fees due from our subscribers for the month, while the information furnished in the remaining columns, provides the necessary material for the appropriation of that sum to the half-year's account in which service has to be rendered, in consideration of the subscriptions payable in advance.

The next thing to be done is to post the amounts, in respect of each centre, to a "B" Book. This book shows the amount of revenue accrued to date in respect of every centre for any month.

There is another book called the "Summary of Rentals" and this is ruled in the same way as the "B" Book.

The total of the "A" Book is posted each month to the Summary Book, which enables the department to do two things: First, to ascertain the accrued revenue for the month in respect of the whole of the centres, and second, to show the accrued revenue at the end of any month in respect of each of the half-years.

A similar set of books is kept and the same procedure adopted for Post Office royalty.

A third set of books is kept for private line rentals, simply as a record of the private line revenue of the Company, and these figures are also obtained from the allocation sheets.

From the Rental "B" Book we thus obtain the accrued revenue for each centre for the month and from the "Summary Books" (referred to in the first paper) we have the expenditure for each centre for the month. The difference between these figures, after adding to the accrued revenue the profit on sales for each centre, and adding to the expenditure as per the Summary Book, the Head Office expenses and the Post Office royalty as per the Royalty "B" Book, represents the gross profit month by month and eventually for the half-year. The figure for profit on sales is obtained from the No. 2A Return, less any expenditure charged under this head during the month through the Nos. 4, 5 or 6 Returns.

One or two remarks as to the necessary Journal entries may be interesting.

The fundamental principle of double entry bookkeeping is that every "debit" must have a corresponding "credit"—therefore, when we credit "revenue account" for the respective half-years, the aggregate is placed to the debit of "outstanding rentals account" in the Head Office books. This latter account is then credited each month with the rentals and fees received as per the No. 1 Return, viz., the total of the received column on the No. 2 Summary, and the balance represents the total "outstandings" for the whole of the centres as shown on the No. 2 Summary, and eventually finds its way on to the balance sheet, where it appears as "sunday debtors for outstanding rentals." In the reverse way we debit royalty account for the various half-years and credit the Postmaster-General, with the 10 per cent. due on the exchange revenue, which is a very serious item in the Company's expenditure, and is shown each half-year in the profit and loss account as a deduction from the revenue, and the Postmaster-General's account is closed by the payments made to the department.

The posting of the three sets of Revenue Books each month entails over 10,000 entries in pounds, shillings and pence, in addition to the casting of something like 1,500 columns and cross castings, while the allocation sheets for the month contain about 110,000 entries.

A "table for apportioning rentals" has been complied by members of the audit department and has been found most useful, not only at Head Office but by rental clerks and others throughout the country.

I am reminded that in my first paper I omitted to state how useful in checking the pay rolls we find a penny book, published by Ward, Lock, & Co., of London. It is a book comprising tables for calculating wages from 4s. to 60s. per week, for weeks of 48 to 54 hours, and it is strongly recommended to all whose duties lie in this direction.

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"*BY THE STAFF FOR THE STAFF.*"

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OUR FIRST YEAR.

WITH this number the JOURNAL completes the first year of its existence, and on the whole it may be considered a successful year. With journals, as with other infants, we believe the second year embraces the critical stage; but both as contributors and as subscribers and readers the great staff of the National Telephone Company have supported the JOURNAL to such good purpose that we face the future with confidence. We feel that the JOURNAL fulfils a useful mission. Alike in the pages devoted to technical and other articles and in those devoted to news of the doings and movement of the staff, the JOURNAL testifies in every issue to the wide range of interest which our fascinating industry covers and to the greatness of the organisation of which the JOURNAL is, we trust, a not unworthy representative.

In the columns of the JOURNAL the engineer talks to the clerk, the inspector exchanges views with the accountant, the contract man learns something of the traffic manager, and the operator and the instrument setter meet on common ground. From typewriting practice to transmission problems, from the theory of rates to the practice of dealing with empty packing-cases, from power plants to filing systems, from broad questions of development, organisation and high telephonic strategy down to the best method of answering a telephone call or tending the office counter, the staff has had its say in the columns of the JOURNAL. And there is still so much to say on so many branches of our Protean industry—the telephone service—that there is little fear of the stream of telephonic lore running dry. As to the news columns, they every month demonstrate to all who read the vastness of the organisation to which most subscribers of the JOURNAL belong, and in which we believe most of them take a hearty and justifiable pride. From Lands End to John o' Groats, from Galway to the East Riding, comes news of the doings of Nationalists — not political, but telephone Nationalists. News of meetings of National Telephone Societies for the discussion of the scientific and commercial problems of modern telephony, news of staff social gatherings, dances, dinners, whist drives, cricket and football matches, rifle clubs, news of promotions and transfers, of marriages, and occasionally, as must happen in all communities, of sickness and of death—pours in from all corners of the British Isles, and keeps friend in touch with friend and old companions with each other across the length and breadth of the country.

The JOURNAL's circulation has extended rapidly beyond National circles and now includes readers in almost every European country —in America, in Australia, in Egypt, in South Africa, in the Far East, and in the various parts of the British Empire beyond the seas. Perhaps some of our discussions on the merits of Amberg cases and Shannon files may be *caviare* to a few of our foreign and Colonial readers, but on the other hand many pages of each issue are of practical value to everyone interested in telephony.

FLOATING BRANCH EXCHANGES.

THE reference made in last month's JOURNAL to the private branch exchange equipments designed for the new express Cunarders, the *Lusitania* and *Mauretania*, has called forth a certain amount of comment in the daily Press. The *Scotsman* says that "British shipowners appear to be gradually overcoming their conservatism in business methods, and are beginning to approximate more closely to the systems of their American and Continental competitors." The Scottish writer goes on to say that the *Lusitania*, which is expected to make her maiden trip this summer, is the first Atlantic liner to be equipped with telephones giving shore communication for the convenience of passengers and officials. In Sweden the telephone has for some time been taken advantage of in this way by shipowners. "For instance, I understand that as soon as the splendid boats which run on the Gothenberg Canal reach Stockholm they are connected with the Central Exchange—one of the largest in Europe—and remain so until they leave again. It is evident that an extension of the system for ships in this country would be of great utility."

The writer of the "Shipping Notes" in the *Daily Telegraph* also has a word to say. After describing the branch exchange scheme, which will put the ships in connection with the local and long-distance service when in port, the writer goes on to say: "Thus, if Liverpool is the port patronised by these big boats on this side, the voyager arrived in the Mersey should be able to ring up his friends in any part of the country and advise them of his safe transit, and of the probable time at which he will be home. The idea is not new, but it is one which has not been adopted on this side of the Atlantic in the same degree as it has in America. Its convenience to a man of business, who wants to communicate with people directly the boat gets in, is so obvious as not to require comment."

As a matter of fact the idea of a board ship private branch telephone exchange, designed to give intercommunication between the various parts of the ship, and to make the local and long-distance service available from any of the telephones on the ship when the vessel is in port, is so new that when it was proposed to the Cunard Company it was not accepted with the prompt enthusiasm that might have been expected. It is quite true that for years past Swedish coasting steamers have carried a single telephone and have had it connected with the exchange when in port, so that the ship became temporarily a subscriber's station. It is also true that

various Atlantic liners and one or two large American passenger vessels have been fitted with internal telephone installations for giving communication between the passengers' cabins and the ship's offices and catering departments. But the National Telephone Company was the first to propose floating private branch exchanges to give a complete telephone service throughout the ship and making the ship installation a part of the general telephone system of the country whenever the ship is in port.

Now that the Cunard Company, in accordance with their record for enterprise, have broken the ice, it is to be hoped that other shipping companies will follow suit and give their officers and passengers the benefit of the service of the universal time-saver. The usefulness on the large passenger vessel of to-day of a complete telephone system, giving instant communication between all working departments of the ship and between the passengers' cabins and the stewards' departments, will demonstrate itself in a single voyage. The modern liner is a huge floating hotel and business establishment. The distances are great and the day's work extremely active. A complete telephone service will effect a saving of time and labour and an improvement in control of staff and in service rendered to the customer in the same way as it does in a similar establishment on shore. In similar establishments on shore the manager who has once had experience of branch exchange telephone service wonders how he ever got on without it. As for the shore communication, to be made available whenever the ships are in port, it should be immensely useful to the shipping companies themselves, as it will put the head offices in constant touch with the ships, and with any part of them, until the moment of sailing, and in the course of a year it will be a great convenience to many passengers. In these high-pressure days, when the use of the universal time-saver, the telephone, is daily becoming more universal, it will be a perfect god-send to many Atlantic passengers to have the shore telephone service available from their own cabins up to a few minutes before sailing and directly after arrival. Time will show how much this facility will be appreciated by the travelling public and to what extent passengers will avail themselves of it, but little exercise of the imagination is required to conjure up occasions on which it will be simply invaluable.

It was formerly a popular notion that most sea travellers went on board ship mainly for rest and change, and found comfort in the absence of all communication with the shore. Even managers of big shipping companies are still possessed by this idea, though the eagerness with which passengers scramble for old newspapers when the pilot comes on board after a passage of only a few days should have taught them better. At first the management of various important steamship lines, acting on the theory that passengers at sea all desire to be completely isolated, resisted the introduction of wireless telegraphy; but public opinion demanded so insistently the equipment of big liners with wireless telegraphy that there was no option but to adopt corrected ideas as to the requirements of modern travellers and to follow the example of the more enterprising lines which had taken up wireless communication from the beginning. We trust that it will be the same with the telephone. Many shipping people at present scout the idea of complete telephone installations on board ship. They are unable to see the value of the service either from their own point of view, in improved working of the ship, or from that of the passengers, in improved communication with the world. That is simply because the idea is novel. But there is no reason why every big passenger vessel should not have its branch telephone exchange and become part of the shore telephone system, when in port, at every port at which it touches. Probably in a few years this will be current shipping practice, and then the shipping people will say, as others have said before them, "How did we ever get on without it?"

HIC ET UBIQUE.

"THE new way of using the telephone," says the *Philadelphia Record*, "supposed to have been hit upon by one of the many health cranks who are concerned with keeping clear of germs, which is to press the receiver against the chest instead of holding it close to the mouth and talking in the usual way the voice, it is claimed, being carried perfectly, is now quite popular in Philadelphia. The less clothing there is between the chest and the receiver the better, but if the pressure be firm the usual amount of wearing apparel, it is declared, does not interfere. The scientific explanation of this phenomenon is that the sounds of the voice, which are made in the chest, are carried by the bones as they would be by a sounding board." This is very "paragraphish." Personally, we prefer holding the *receiver* to the ear to holding it close to the mouth; we find that we can hear better. Having regard to the amount of underserved abuse which the telephone comes in for in all parts of the world, the proposed hygienic method of transmission recalls the following passage in Shakespeare:—

> Poor wounded name! My bosom as a bed
> Shall lodge thee.

A CORRESPONDENT sends us the following cutting, depicting a humorist's idea of "a typical rustic dialogue," when the telephone shall have reached every country house:—

Joe. "Are ye there Bill?"
Bill. "Aye, is it thee, Joe?"
Joe (intelligently). "Aye." (Pause whilst Joe collects his conversational ideas.)
Joe. "How's turmits, Bill?" (Pause whilst Bill mentally surveys turnip fields.)
Bill. "Fly's in turmits." (Several minutes elapse before Joe so recovers from the shock of this intelligence as to ejaculate "Aye!")
Bill (with inspiration) "We wants more sun."
Joe. "Aye, an' rain."
Bill. "Aye, an' a dryin' wind."
Joe. "Aye, an' a bit of calm."
Bill (after lengthy cogitation), "Never was such weather."
Joe (after some moments thought and with enthusiasm), "Get's wuss every year."
Bill (as a last resort), "Wunnerful machine this yere telephone."
Joe (with a strenuous effort of imagination), "'Appen some day us 'll be able to draw a quart through 'un."
(Bill's appreciation of this wonderful idea is cut short, owing to the operator disconnecting them after this instructive little conversation of over ten minutes.)

We do not especially recommend this effort as illuminating to those whose business it is to secure orders at the rural rate. We would rather refer them to a paragraph in the *Telephone News of Philadelphia* which sets out very strikingly the feeling of safety which the possession of a telephone connection inculcates in a farmer's wife and daughters in a lonely house, and also the social advantages it ensures to those cut off by miles of field from their nearest neighbours.

MOST of us have heard that tramps have a secret code of signals for marking gateposts. According to the *Wisconsin Telephone News*, houses with telephones are classed as risky. Tramps have learned that houses so equipped are "tramp proof," because neighbours of the victims may be easily and quickly summoned to oust those who become troublesome. Here again the rural telephone scores.

AN unusual cause of fault is reported from the Thames Valley. A few days ago one of the junction lines (of 100-lb. copper wire) between Abingdon and Wantage was broken down at Sutton Courtenay bridge, where it crosses the Thames, by a swan flying against it.

MAINTENANCE OF PARTY LINES.

BY ERNEST RENDELL.

IT appears to me that the efficiency of party-line service is to a certain extent impaired by the inability of the electrical staff in general to realise the most vital points of party-line maintenance.

Commencing at the exchange, where one would naturally expect to have most trouble, and leaving the question of operating and distribution alone, which although bearing directly on the maintenance question are of sufficient importance to warrant a special article, I will confine myself to the maintenance of the apparatus, simply noting in passing that a little attention by the switchroom inspector *regularly applied*, would reduce exchange trouble to a minimum.

The cord circuits should be tested every morning, not only for intermittent contacts, but the working of relays must also be checked; it is absolutely necessary that these relays be tested regularly, and the adjustment carefully watched. I find the earthing or "Y" relay requires finer adjustment than the lamp or "X" relay, as it draws less current. The contacts should be kept perfectly clean, and the armatures set so that when drawn down they just clear the pole-pieces.

A useful test is afforded by means of an interrupter driven from the shaft of the generator motor, and connected so that each relay is earthed through 1,500ω and 2,000ω respectively, when the cord under test is inserted in the jack to which the interrupter is connected. (See Fig. 1.)

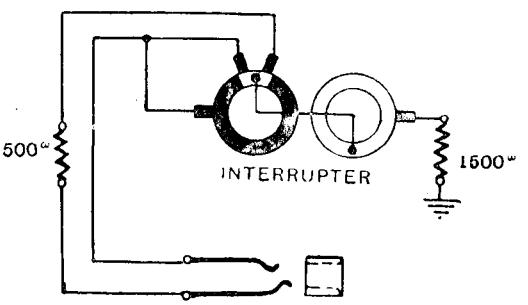

FIG. 1.

If the relays are in working order the clearing lamp will flash in accordance with the revolutions made by the interrupter.

Another important test, sometimes overlooked, is that of the 1,000ω double make and break cut-out relay; the armature is capable of a fairly strong setting, but it should be seen that the top springs break contact when the armature is drawn down, or trouble will be experienced when the magneto subscriber rings off, as he will call both "X" and "Y" subscribers. I give in Fig. 2 the connections of a special testing device which has proved of value in locating these faults.

The party-line plug is inserted in the test jack which is connected as shown to retaining relays, the low resistance windings and the 500ω relays being controlled by the armature of the retaining relays. The corresponding magneto plug is inserted in jack to which is connected a generator current; this operates the cut-out relay on the cord circuit, which, if effective, prevents the retaining relays from being operated; if the cut-out springs are out of adjustment the lamps marked "X" and "Y" would light and plainly indicate where the fault is. The above device can also be used to investigate complaints of "X" and "Y" being simultaneously rung, or to show if cords are reversed, or ringing keys faulty.

As an alternative to the test given above the ringing circuit of a party line could be fitted (see Fig. 3), but this, in my opinion, is not so convenient to handle as the aforementioned. All party-line indicators should be carefully tested twice a week with a split plug to which is attached a 1,000ω resistance coil. Great care should be exercised in marking the indicators and when possible number plates should be avoided, or if fitted, they should be made secure.

The test clerk has an important duty to perform in connection with the maintenance of the party lines, for unless a complete investigation is made of every complaint much harm may result.

It is not sufficient simply to ring up the two subscribers, and ask *them* if the telephone is working all right. He must make an

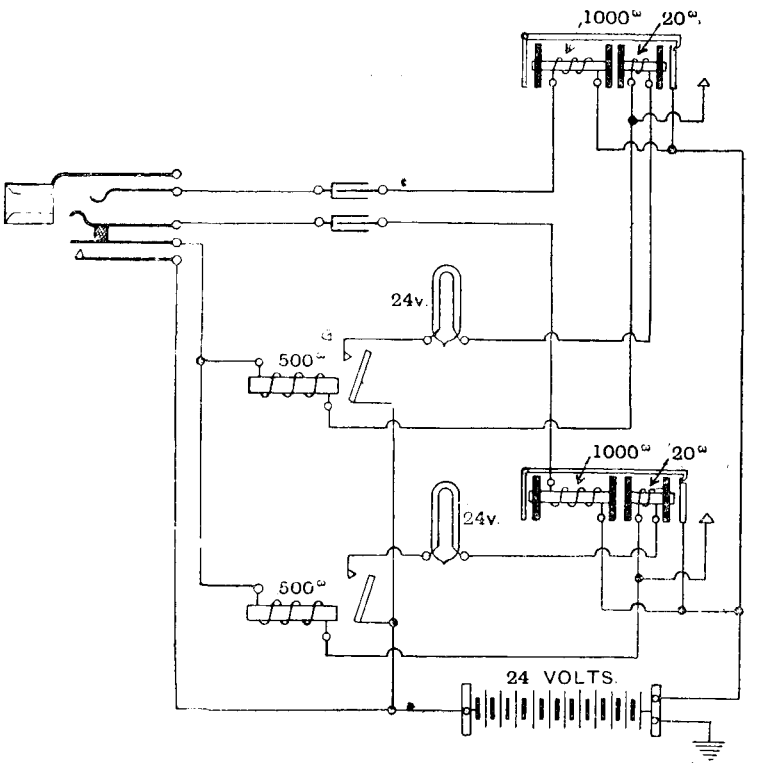

FIG. 2.

intelligent test, and what is more, *note* any recurring trouble and not report "O.K." until he is certain the trouble has been removed. The test clerk should be thoroughly conversant with the connections at both ends, subscriber's station and exchange, and if necessary should have a complete diagram before him, and work to it. A tabulated list of general deflections should be to hand for reference, such as are given below; these readings apply to Weston voltmeter, but a comparative table could be made for other tests.

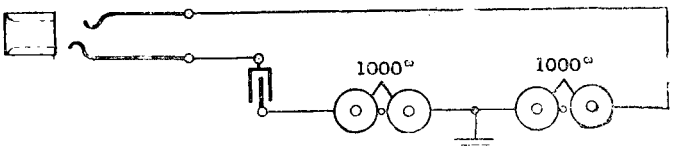

FIG. 3.

1. LINE "X" (NO CONDENSER).

Where no extension bell is fitted deflections will vary (approximately) between 19° and 20·75°, using 4 volts and shunt.

Where extension bell is fitted in shunt, the deflection will vary between 25° and 26°, using 4 volts and shunt.

Higher deflections indicate that insulation is bad.

2. LINE "Y" (CONDENSER).

Practically no deflection should be obtained; where the reading exceeds 4°, using 4 volts and shunt coil, the insulation is bad.

The condenser kick should throw the needle a quarter-way across scale, using 40 volts.

3. LOOP.

The same readings practically will be obtained on both legs with either "X" or "Y" secondaries in circuit as in Table 1.

The test clerk should be in a position to instruct the inspector, and should control the test.

The inspector, of course, will see that all wires are on their proper terminals, but the test clerk can tell definitely so that the latter should order the mode of procedure, and his instructions to the inspectors might be based on the following lines:—

For insulation test, take earth wire off instrument. If reading is obtained take lines off window terminal, taking care to examine the latter, first at "X" and then "Y."

If clear on lines and window terminals, test office wires, not forgetting to take off extension bell wires while testing instrument wires.

The insulation of "Y" lines is most important, and great care should be exercised in stapling all office wires; it should be the rule of the fitter to open out the triple wire with a pointed tool and staple the earth wire only; he should avoid runs that are likely to prove damp.

For continuity test, earth lines at instruments. If earth is unsatisfactory at window terminal, try a good temporary earth and connect direct to lines. If line and earth are "O.K." and bell coils are suspected, bridge them over; if deflection be not obtained, earth condenser terminals, bridge out condenser, earth bell terminals; and lastly, terminal "E," and fault will lie beyond where the deflection is last obtained.

Better working is secured if extension bells are shunted, in this case each bell circuit should be alternately cut out and separately tested when deflections are too small.

Party-line receivers are liable to disconnections from electrolytic action, and as it is generally one coil only that is affected this can be taken out and instrument temporarily worked on the other. Switch hooks should be properly adjusted and must work freely, and intermittent and noisy instrument cords promptly changed.

Much of the test clerk's valuable time is wasted by inspectors not being sure of connections. Diagrams should either be committed to memory or be kept to hand for reference.

The clearing signals afford a ready test for bell coils.

For drawing current on "Y" and all tests for partial disconnections on the instrument and office wires, use detector.

THE LARGEST BUSINESS BRANCH EXCHANGE.

By E. S. FRANCIS.

THE opening of the private branch switchboard at the New Liverpool Cotton Exchange, on Jan. 2, 1907, was an interesting event, from the fact that it is the first common battery switchboard to be installed in this city; but apart from that, the system of working differs slightly from that of the majority of private branch equipments, and, therefore, it was thought that a short description would probably interest readers of the JOURNAL.

The New Cotton Exchange is a magnificent building, which has been erected at a cost of £250,000 in Old Hall Street, to which it presents a very fine front. The interior consists of the exchange, a large hall of artistic design, 140 feet long by 130 feet wide, and nearly 100 feet high, containing the ring or pit where transactions in "futures" are conducted; also a promenade gallery, supported on Norwegian granite pillars, running completely round the room. This, together with the ample space on the floor of the exchange, is for the convenience of members who wish to discuss business and other matters. At the rear of the exchange a seven-storey building has been constructed, containing suites of offices which are occupied by about 80 cotton firms. Underneath the gallery, upon the right-hand side of the exchange, the Post Office, Telegraph and Foreign Cable Offices are situated, the latter having a direct wire to the United States.

Upon the opposite side, nine telephone silence cabinets and 21 open stalls are ranged, and occupy the whole of the wall space upon that side. The switchboards for controlling them are placed about ten feet forward, so that a member desiring to make calls must pass the attendants seated at the switchboards before entering one of the boxes. In designing the telephone installation for the Cotton Exchange, the main fact which had to be borne in mind was that the variations in the traffic load are very considerable, the calls coming in rushes directly any important change in the market takes place. The greatest number of calls is generally passed immediately after 10 a.m. when the market opens, as prices have to be communicated to various firms in Liverpool and in distant towns; and it is no uncommon thing for over 40 trunk calls to be booked within five minutes.

It was therefore necessary to make ample provision for dealing with any reasonable number of calls originating at one time, and I think that the system which has been designed by the Engineer-in-Chief should prove equal to any emergency.

The equipment consists of two separate installations, one of which is connected to the exchange system, and controls twenty of the boxes, the other controlling the remaining ten boxes, and having connected to it 170 private wires (and accommodation for 200) running to the offices of cotton firms, inside and outside the building. This system, however, has no intercommunication with the exchange.

The photograph, Fig. 1, gives a general view of the boxes, which are of novel construction, the sides and backs consisting of slabs of white opal glass, which, besides having a clean and neat appearance, prevent callers from making notes on the walls. The instruments, as may be seen, are of the standard common battery type, and are suspended by means of clips on brass rods fixed to

FIG. 1.

wooden fillets in the corners, the glass backs not being sufficiently thick to withstand the strain.

Fig. 2 shows the arrangement of the switchboards. On the left-hand side is a desk (No. 1) at which the attendant sits who deals with local and junction calls, and on the right is the private branch switchboard (No. 2) through which box lines from the Central Exchange to the boxes pass, and upon which also trunk calls mature. No. 3 is the private wire switchboard.

Callers for numbers in the Liverpool area apply to the attendant at the table, who immediately presses an order wire key and passes the exchange number wanted to the Central operator, at the same time allotting the number of the box from which the caller may speak, a set of signals in front of the attendant indicating which boxes are disengaged. The Central operator completes the call upon that box, or notifies the caller that it is ineffective.

In order to ensure a prompt and efficient service, two order wires have been provided, which connect the attendant's table to the instrument circuits of two operators' positions at the Central Exchange, each of which is equipped with seven junctions terminating on cords and running direct to fourteen out of the first twenty boxes, but passing through break jacks on the No. 2 switchboard, so that the attendant there can use these boxes in connection with other lines if he so desires. There are also three extra lines terminating at Central in a similar manner to the first fourteen, but terminating at the Cotton Exchange on plugs which can be plugged

into any box jack, should occasion arise. The attendant in passing numbers to the operator uses the order wires alternately, but should all the boxes upon one order wire be engaged, the operator on that position can use those connected to the other position by means

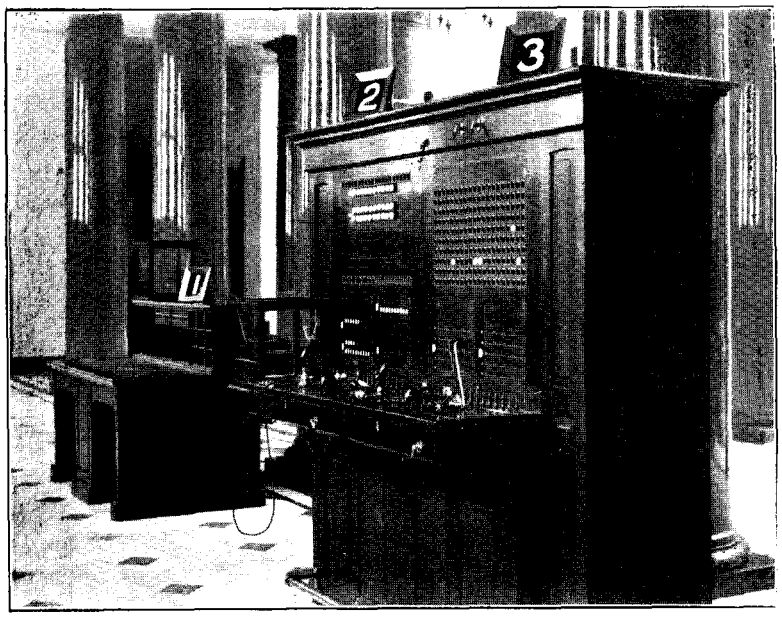

FIG. 2.

of pairs of "helping out" cords, one of which would be plugged into a jack connected with the box lines, and the other into the called subscriber's multiple jack. Upon completing his conversation, the caller hangs up his receiver, which gives the clearing signal to the attendant on the "box engaged" signals, and to the Central operator upon one of two lamps connected to each of the box line cords, the other lamp being operated by the magneto subscriber's ring-off.

Fig. 3 shows one of the glass boxes for the reception of tickets used by the members when making calls. The exchange service is

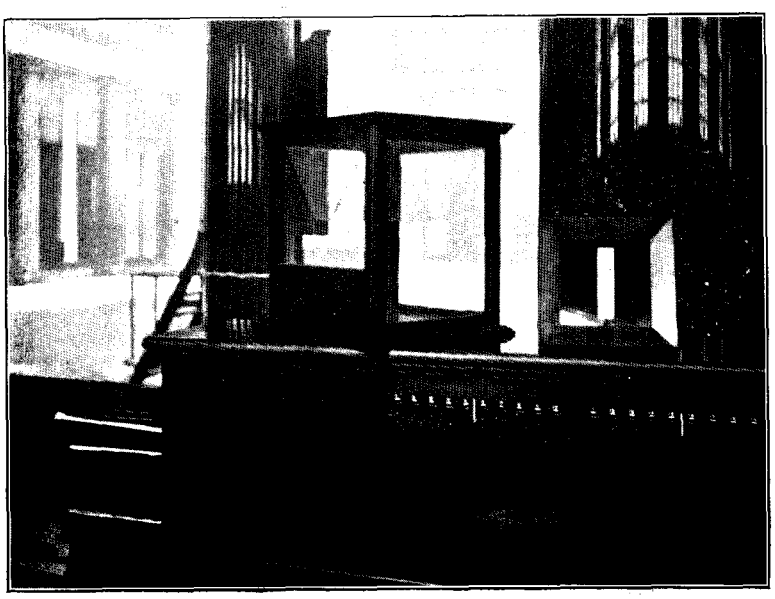

FIG. 3.

on the measured rate system, and the tickets are sold to the members by the Cotton Association, the Company charging for the calls in bulk, and one of these tickets is handed to the attendant each time a call is made.

The telephone service is of such vital importance to the members of the Cotton Exchange that almost extravagant means have been resorted to in order to make it meet their requirements, and I think it can safely be said that the service provided is as near perfection as it is possible to attain with present-day apparatus; but it must be admitted that the conditions under which it is given are exceedingly favourable. Two of the most experienced senior operators work the positions in the Central Exchange, and deal, between them, with not more than 200 calls in the busiest hour, and when it is considered that they are relieved entirely of the operation of plugging in to answering jacks, it can be understood that the work per operator is very light.

The trunk service has no special features, except that the Post Office Exchange is connected to the Cotton Exchange by a direct order wire to prevent delays in recording calls. A call is booked under the name of "Cotton Exchange," and not to any particular number, and, upon maturing, it is connected *via* Central to one of six trunk junctions which terminate upon self-restoring drops, having listening keys and plugs in connection with them similar to ordinary ringing junctions.

The attendant at No. 2 switchboard who answers the trunk junctions immediately calls the member from the ring, and informs him of the number of the box to which he has made the connection.

The calling of members, which is now done by megaphone will shortly be effected by means of a set of 300 numbers arranged on a large screen 12 feet 6 inches by 11 feet, and illuminated by electric lamps controlled by a switchboard. Each member of the exchange will be allotted a number, and when it is desired to call him, the attendant at the switchboard will press a switch key belonging to his number, which closes the lamp circuit and lights two eight-candle-power lamps enclosed in a box with a ground-glass front, having the background of the figures painted black so that the number stands out illuminated. The lighting up of each number also rings a single stroke bell, which will be loud enough to be heard above the din of the market.

The private wire switchboard No. 3 is of the standard private branch type, with the addition of ten single cords and machine ringing keys connected to the ten private wire boxes, but having no listening keys connected with them. The boxes are for the convenience of members desiring to call their offices from the "floor" of the Exchange, and upon receiving a request for a connection the attendant allots the box, at the same time connecting the cord belonging to that box with the jack of the number required, and pressing the machine key, which of course "restores" when the called subscriber answers.

In a room situated in the basement of the building, the test frame, relay rack, and accumulators are fitted, the latter being charged continuously from a 30-volt battery at the Central Exchange, through twelve pairs of leads in the 400-pair cable which connects the two places. In order to prevent the fumes from affecting the apparatus, the accumulators are enclosed in an airtight glass case with removable sides and a vent pipe exhausting into a ventilating shaft for the purpose of carrying away the gases. The interrupted ringing current is also brought through the cable, but this is supplied from the Royal Exchange, which has a more up-to-date ringing plant than that at Central.

If I have not already taken up too much space, I will conclude with a short description of the wiring of the offices in the building, which has been done on a plan that has been found to work very successfully in Liverpool. From strips of tabs on the test frame in the basement four 100-pair lead-covered dry-core cables run vertically through casing up four points of the building, which are most suitable for distribution. Upon each floor T-joints have been made, and a number of wires led on to a distributing box composed of a set of block connectors arranged in rows on a board, and protected by tin covers. The number led out on each floor was decided upon after a survey of the office accommodation had been made, as the higher one ascends a building the lower will the class of office become—a state of things which electric lifts have not yet rectified; and our assumption that those who can afford the most rent will require the greatest number of telephones has, in this instance, proved correct. However, it is a very difficult matter to estimate the exact telephone requirements of a firm, so in order that the system should be quite flexible, provision was made for drawing from other floors, should the necessity arise.

The wiring from the distributing boxes to the subscribers' offices has been done with cable where possible, and with 22/15 vulcanised india-rubber wire where single pairs were required, the

whole being run in wood casing fitted to the top of the cornice in the corridors, out of sight, and led into the offices, which are constructed of "Fram fireproof partitions," through small lead pipes; 22 15 wire was used partly on account of its good insulation, but principally because the size of the wood casing, being limited by the architects of the building, did not admit of order wire 3 being used.

The installation, which was fitted complete in eight days, has been working very successfully since the opening, the only trouble experienced so far being due to the fact that the acoustic properties of the exchange make open stalls an impossibility, and we are now engaged in converting them into silent cabinets, which will overcome the difficulty.

"'TIS BUT A TENT."

THE Telephone in Persia.—According to the papers a public telephone connected to the Palace has been installed in the Square at Teheran, so that his subjects may lay their grievances before the Shah. Shade of Omar Khayyam!

I passed at Morn across the Market Square
And lo! a strange Kiosk was standing there,
Whence to the Palace of the King of Kings
A burnished Wire stretched gleaming in the Air.
I spake with one about to enter in:
"Brother, pray tell me what thou would'st begin?"
Quoth he: "I venture on the Telephone,
(A work of Sheitàn or some potent Djinn.)
They say that in a kind of Harim sit
Before a Loom (designed by Frankish wit
And called by them a Switch Board), Odalisques
Who answer, when the Faithful call for It.
And they who penetrate that silent Door,
And with Insistence in the Mouthpiece roar
Through It perchance may gain the royal Ear
And win the Justice they were hoping for."
"Cut off," one cries, emerging from the Hut.
"We have the Scimitar and Bowstring, but
The Franks conspire to arm the hands of Fate!"
And goes his way with many a murmured "Tut."
Another in the Slot his Coin throws,
And bellows multitudinous "Hallos";
But, having failed to press the Lever down,
Cannot be heard and forth in Dudgeon goes.
"Perchance she knits, or plays some girlish game"
Quoth he; which plainly does the truth proclaim;
Follow the Sun his fiery course around
In every Land subscribers are the same.
However, those who seed of Progress sow,
And labour with their Hands to make it grow,
Deserve the Harvest they at length shall reap
When over all the Land their Lines shall go.
A book of Numbers underneath the Bough,
A Telephone connected up somehow
Beside me ringing in the Wilderness,
The Wilderness were civilized enow!.—W. H. G.

EXPERT OPINION ON THE N.T.C.

OUR eminent contemporary the *Statist*, one of the most authoritative and expert newspapers dealing with industrial and financial affairs, has always been among the few journals which have taken a reasonably just view of the difficulties under which the National Telephone Company has laboured and the measure of success which it has achieved. From a long article in a recent issue, dealing with the present position of the Company, we extract the following:—

Though to a large extent interest, from an investment point of view, in the affairs of the National Telephone Company, Limited, is considerably smaller than it was at one time, owing to the short span of life now remaining to the Company, yet an examination of the progress that has continued to be made is interesting from more than one point of view. Though the Company has had many difficulties to fight against, nevertheless its career has been one of great success, and the figures that are available concerning the progress made, show that private enterprise is able to carry on a great industry in a successful manner, in spite of Government interference and Governmental opposition.

The reproach is frequently brought that this country is very much behind in the matter of its telephones, as compared with other countries; and while not admitting the absolute truth of the contention, there is no doubt that had the National Telephone Company been able to secure a free hand in the development of the telephone system of the country the progress in telephony would have been very much greater than it has actually been. But when the actual facts of the situation are taken into account the first feeling is one of surprise that so much progress has been made, and secondly, that the Company has so successfully overcome the opposition and difficulties with which it has been surrounded. The history of the concern of late years especially, is of course well known, and there is no need for us to go into detail, and it is only necessary for us to point out to our readers that the Company has been alternately blessed and cursed by the Government, that co-operation and competition have succeeded one another, and that the only consistent policy followed by the State has been to persistently harass as much as possible the extension of the Company's business.

Not only has Governmental opposition and interference had to be contended with, but a considerable amount of misrepresentation has had to be faced on the part of a section of the public. This section, not always the wisest and sometimes of the most ignorant, invariably raises indignant protests against anything that partakes of the nature of a monopoly, and as, in the nature of things, an efficient telephone service must be of this nature, the section of the public referred to has done its level best to bring an end to the existence of private enterprise in the telephone industry.

In spite of difficulties the National Telephone Company, Limited, goes on increasing its business and, consequently, enlarging its profits. This, of course, is not surprising when regard is had to the fact that the telephone has long ago passed out of the category of a luxury, and has become more and more of a necessity day by day. That telephones must now be had is more or less a truism, and consequently each day sees some new recruit to the ranks of telephone users, and thus it is perfectly obvious that the business must increase.

BANGEM'S TELEPHONE.

By J. S. R.

I.

BANGEM was at the telephone. The vibration of the building was proof of this, or of an earthquake. His thousand-revolution-to-the-minute energy was fully expended on the handle, until it was incontestably evident to everyone in the vicinity, that Bangem was using the telephone, and language, which, for the sake of euphemy, may be called vigorous. The only ones who seemed oblivious to it all were the operators at the exchange.

It was at this psychological moment that the telephone inspector, who had been sent post haste by the telephone authorities to find the reason for their being unable to call the subscriber, arrived. His practiced eye immediately detected the cause of the "fault," and, turning to Bangem, said:

"I can see the reason for your not being able to get the exchange; your employees have been having sardines for tea and —" He got no furthur, for Bangem angrily interrupted him with: "Its scandalous! Here I pay for a telephone which we can't use when we want to, and now you come with a cock-and-bull tale about our having had sardines for tea. Why don't you say it's whisky, and we can't turn the handle! Goodness knows, we've had practice enough. I have been at it myself for the last half-hour and even *now* I hav'nt got the exchange. It's my opinion the operators shut us off when *they* have *their* tea, so as not to be disturbed. It's monstrous that such monopolies should be allowed."

The inspector waited for Mr. Bangem's anger to subside, and at last obtained the opportunity of continuing. "Pardon me sir, but if you will kindly remove that sardine tin from off the window terminals, where it has been inadvertently placed by your people, you will I think, find the instrument in perfect order. You see, the effect of placing a piece of metal, which is a conductor, on to the brass screws or terminals is to cause what is technically known as "a short circuit on the line," and consequently, the instrument is cut off from the exchange."

Mr. Bangem was nonplussed for the moment, but rising to the occasion he said in a voice of thunder: "It's all very well for your people to get out of it like that, but why on earth didn't you warn us against doing it?"

II.

"So you ARE going to alter your telephones at last"—said Mr. Bangem, as he stood glaring at the official, who had just intimated that his telephone would be worked on a new system. "And let me inform you," he continued, "it's not before it's wanted." I might be taken for an Italian organ grinder with a

monkey on the top, the way I have to turn away at that hurdy-gurdy of yours before I can get the number I want; and when I am connected I find it's to the wrong people, and your operator has the impudence to tell me that its through my not mentioning the name of the exchange. She ought to know by this time that if I ring up for that particular number that it's the East Exchange I want and its ridiculous putting me on to the Central."

Mr. Bangem paused here merely because he was out of breath, but it gave the official a chance of saying—"As you have an objection to the magneto type of instrument, I am pleased to inform you, that there will be no necessity to turn the handle in future, as your telephone will now be on the C.B. system and all that you—"

The mention of C.B. was too much for Bangem, and was evidently associated in his partisan mind with a certain prominent statesman, for he burst in with "Yes! I know the Government are going to take it over, but I'll not be a party to any C.B. system. I'm a good old Tory, and shall oppose it tooth and nail." The inspector, having made the necessary explanations, continued: "I was saying you would now have no necessity to do anything but lift the receiver from the hook, which simple act would call the operator by causing a little lamp to glow at the Exchange. Thus there will now be no need for you to ring at all. In fact that part of the apparatus will be done away with."

During the delivery of these few words, the inspector became conscious of an increasing redness and swelling in Bangem's face, and it is impossible to say what disastrous result would have followed, had not that gentleman's natural safety valve opened, and his speech returned. "What! bellowed Mr. Bangem, "You are going to take the only means I have of letting the exchange know that I am standing like a stuffed dummy in front of the instrument. I knew you had some underhand scheme on foot."

NOTICES.

MICHAEL FARADAY MEMORIAL.—There are still a few copies left of the mounted photographs of those present at the unveiling ceremony, and also of the mounted photograph of the memorial plate; these can be obtained from Mr. Gill at 2*s.* 6*d.* and 1*s.* 9*d.* respectively.

PORTRAITS.—Reproductions on sunk art plates of the portraits of Messrs. Anns, Valentine, Coleman and the late Sir James Fergusson may now be obtained; price 6*d.* each.

COVERS FOR BINDING.—Arrangements have been made for the supply of covers for binding the first volume of the JOURNAL. They will shortly be obtainable, price 1*s.* 6*d.* each.

CORRESPONDENCE.

TRAINING OF ELECTRICAL STAFF.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REFERRING to the article by Mr. Allan in the January JOURNAL regarding the training of the electrical staff, I think such a system would be a great improvement in the method of dealing with apprentices. At present an apprentice seems to get very little attention at all, and is just allowed to drag along for a convenient time in a department; no one seems to care what particular talent he may show, except perhaps his immediate chief, who, of course, benefits according to the work the apprentice is capable of doing, and if he be useful, so much the more does he try to keep him in his department so long as possible. Now an apprentice who is desirous of getting along naturally expects that when he works hard, and so learns quickly, he will be advanced accordingly. When he finds that nobody seems to particularly care what he does, he loses heart and begins to drag along as easily as he can. Also, as far as my experience goes, and it is not confined to one centre, I cannot say that a learner is encouraged to ask questions, and spend a little time in actually learning anything; instead, he is expected to do a maximum of work and pick up what information he can by the way.

There is one department not mentioned by Mr. Allan, of which I think an apprentice electrician should get some experience, and that is the power room. The importance of the power plant in a modern common battery exchange is not to be denied. And surely, considering this, it would be well to devote a few months of a learner's time to experience gained there.

Edinburgh, January, 1907. D. A. CHRISTIAN.

CABLE RECORDS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

SEEING that underground work is now being laid down generally throughout the country, I think the time has arrived for a standard system of local records to be brought into use, showing the various circuits in use and spare at each distributing point of an underground system. On the completion of my first underground scheme I made up a rough record in an ordinary blank book, but afterwards found this cumbersome, and furthermore the book in a year or so got torn and became useless. Since the completion of the Hamilton underground work I have brought into use a card system of records, sample card of which I attach. The system is flexible, and in the event of a card getting either filled up or damaged it is very easily replaced. It also forms a useful record to the engineering department, for they can see at a glance how the loads at the various distributing points are rising or falling, and in the event of fire there is available an exact list of subscribers at the various points. It is also convenient for the returns clerk, as it provides correct data for checking the mileage of underground wires in use and spare on the No. 3B Return.

50-pair Cable. Section 646 yards.

Pole.—Burns, 37, Campbell Street, Hamilton.

		Total Mileage of spare.
		Yards
(27) Cooper & Co., Cadzon Street, 1292	2,584	64,600
(52) Pevie & Johnstone, 1292		62,016

(Subscriber's exchange number, name, address, and mileage in section are entered here; the total mileage on each line appears in next column, and in the last column is shown the total spare mileage in the section.)

I believe that other districts adopt various methods for cable records, and I think we might have an expression of opinion on this subject in the JOURNAL, with a view of getting at the best practice, and possibly inducing the Engineer-in-Chief to standardise a general system.

Hamilton, January, 1907. JOHN T. WHITELAW, District Manager.

TEAM WORK IN OFFICES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

WITH reference to Mr. Lynn's article in the August JOURNAL and subsequent letters, the question of a clerk acquiring knowledge outside his own particular duties is of much importance both to the Company and to the employee, and should not be left entirely in the hands of the latter. The work should be organised, to ensure the opportunity being given to each clerk to acquire a good knowledge of district office routine. A man of all-round ability is generally of much more value to the Company—especially in the case of emergency—than a specialist.

It is of course essential that a clerk should be thoroughly at home with the duties for which he is directly responsible, but surely there is a time when it becomes impossible for him to increase his usefulness in his particular department. I do not see the necessity for any clerk to be in what has been described as a "watertight compartment." It is just a matter of organisation, and it should be rendered impossible for an employee to get so circumstanced. If he is so unfortunately placed, organisation should very shortly give him a little latitude. Neither should it be a question of burning midnight oil, or of half-hours spent spying over a fellow clerk's shoulder—which is so much waste—to acquire knowledge of other duties.

Here the work is so allocated as to render it necessary for an assistant to be provided to each three clerks or departments. The assistant is always the junior, there is therefore adequate control. The benefits of such a system are not fully felt immediately, but they must certainly materialise in an increasing degree from the moment the system is instituted. As the assistant becomes proficient nothing very much can go astray if, under the eye of the senior clerk, he takes over his duties for a time, whilst the senior devotes his time to acquiring knowledge outside his own particular department. The final result is that a staff is secured possessing a good general knowledge of district office routine. With this knowledge they are in a position to take a much more intelligent interest in their work than would be the case if they were inhabitants of that watertight compartment. The method briefly outlined was adopted here about three years ago, with the result that we now possess efficient rental register, stores, and wages clerks who were formerly stores, fees, and rental register clerks respectively, also an assistant who can take any duty in the office.

The staff is a contented one, overtime is seldom necessary, and the district is one which renders four sets of returns and has 450 stations per district office clerk.

Bolton, January, 1907. A. N. ENTWISTLE, Chief Clerk.

POT-HEADS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I WOULD like to ask Mr. Frost if he never has any wet weather in his centre? Personally, I find "preparing leads for pot-heads" one of the best possible jobs to put the men on when it is necessary to "stand by" on account of sudden heavy rain, and, as cable work is nearly always more or less slow in its preliminary stages, this fickle climate is generally good (or bad) enough to provide us with the needful wet spell.

As to having pot-heads prepared at the factory to avoid "bad methods," why should there be any "bad methods"? The instructions are definite enough, and every local manager or engineer is, I presume, capable of getting into an old suit of clothes and showing a smart man—who can generally be found by a process of elimination in every gang—how to make a pot-head or cable point properly; one lesson should be enough.

It is I think, a great pity there is such a tendency amongst some of the staff to want everything done for them by Head Office or factory; one can never tell when a sudden emergency may arise, and this help be unavailable without delay. Every local manager and engineer's ambition should, in my opinion, be to have his centre as self-contained as possible so that he can never be taken at a disadvantage except by extraordinary circumstances such as a fire.

I have always found it possible to pick up men capable of being trained either into cable jointers or wiremen, but perhaps I may be more lucky in this

respect than others. Still, I think that by careful selection and the weeding out of incompetents, a homogeneous and efficient staff can be got together in almost any provincial centre.

Weybridge, January, 1907. J. STUART BEST, Local Manager.

A "NATIONAL" CLUB.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

MAY I take up a small space in your paper in bringing before the employees of the National Telephone Company a proposition. I feel sure there are many centres in which the members of the different departments are more or less strangers to each other, their dealings rarely bringing them together. There are also many unmarried members who are in lodgings, or who have been drafted to a strange town and have not been able (or felt inclined) to find friends with whom to spend some of their spare time

Why should not each centre of any size have its own club, where members might meet each other and indulge in pastimes such as cards, chess, draughts, dominoes, billiards, etc.?

The premises could also be used for the meetings of telephone societies, lectures, etc., while I am sure many members would make use of the club to do their correspondence class papers. A small technical library would be found very useful for reference.

At first sight the expense might seem a stumbling block, but this disappears when the matter is gone into.

It is not possible to go fully into the matter on account of space, but briefly it could be worked on two systems as follows:—

(*a*) I am sure there are many members in different centres who would be prepared to finance the scheme. Each member to pay a small entrance fee and a weekly sum, while the revenue from billiards, refreshments, etc., would yield sufficient profit not only to pay maintenance expenses but to pay the promoters a small interest on their capital, which could be reduced from time to time until the club became the property of the members

The objection to this is that many would not feel inclined to put money into a scheme which might at any time fall through for want of support. Then the alternative scheme might be considered.

(*b*) There are many reliable firms who would furnish and equip a club on the hire-purchase system, the advantage of this being that should it at any time be found necessary to disband the club the surrendering of the goods would release the hirers from further liability

The weekly or monthly subscription which the members pay would meet the rental for the goods.

To start a club on this system each member would take up a share in the club of, say, 5*s*. on allotment and a further call of 2*s*. 6*d*. per share at an interval of not less than six months, if required, and a small weekly or monthly subscription.

Thus I estimate that a comfortable club could be equipped (including a three-quarter size billiard table) for £60. This, spread over three years, would be roughly 10*s*. per week; rent, say, 15*s*.; and a further 10*s*. would be necessary for cleaning, attendance and sundries; making a total of 30*s*. per week necessary for maintenance.

Revenue from billiards (taking it at only four games per night, at 3*d*. per 100) would be 6*s* per week. A further 6*s*. should be easily made from profits on refreshments. A membership of 40 at 6*d*. per week would be £1; this added to the above items would be £1 12*s*. per week.

The 40 shares at 5*s* would bring in £10, which would leave a margin for the reserve fund after paying cash for sundries (that is cards, chess, stock, etc.).

The committee could redeem the share of any member who left the Company or who was transferred to another centre, this share again being sold to his successor.

There could be a league in each province which each centre having a club could join, and I am sure many pleasant visits could be exchanged in playing home and home matches with the different centres at billiards, chest, whist, cribbage, etc.

Perhaps other members of the staff would offer their views on the matter.

The remarks as to revenue, etc, are only given to explain the working of the two systems, and the figures are, of course, open to re-arrangement.

Nottingham, January, 1907. A. G. HOBBS.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

I AM willing to find £5 share, capital and subscribe one guinea a year towards the establishment and upkeep of a club-house, on hotel lines, in a central position, say Derbyshire, where a subscribing member would be entitled to free use of rooms, including bed for a reasonable time.

I think such a place would become popular as a holiday house, a convalescent centre, and a meeting place for colleagues who want to spend a few days or a week-end together.

Leicester, January, 1907. JOHN ASHTON.

TELEPHONE SOCIETIES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

SINCE I wrote in last May, Telephone Societies have been formed according to the JOURNAL, at Birmingham, Cardiff, Bradford, Portsmouth, Bristol, Newcastle-on-Tyne, Dublin, Plymouth, Coventry, Swansea, Leicester, Norwich, and Southampton, but there is no report of any similar societies at Leeds, Dundee, Hull, Nottingham, or Edinburgh.

It would be interesting to know which of the two reasons mentioned in the third paragraph of my former letter accounts for this.

February, 1907. "X."

LIGHTING AT POWER RATES.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

REFERRING to your footnote to my letter on the above subject, in the current issue of the JOURNAL, I beg to explain that in giving the comparison between 200 and 24 volts, I had in mind the Company's 24-volt circuit. Since *eleven cells only* are supplied, and fall of potential is to be considered, the actual voltage at the lamps is not 24, hence my figures.

The primary object of my letter was to point out the fact that supply companies and corporations refused to supply current at power rates for motor-dynamos, and also that the large capital outlay to instal, or change the system to low voltage, would be prohibitive.

Oldham. W. B. CHEETHAM, Chief Electrician.

AN EARLY TELEPHONE SOCIETY.

TO THE EDITOR OF THE NATIONAL TELEPHONE JOURNAL.

IS Mr. Jarratt quite correct in describing in the February number the Sunderland meetings of 1887 as a telephone society? From what he says, it would seem as if the meetings were conferences of certain selected individuals only, and if so were they not rather forerunners of the officers' meetings (now common) than of telephone societies?

The first is dictated by the interests of the business, the second is a voluntary association meeting for mutual benefit.

February, 1907. F. GILL.

[Owing to pressure on space several interesting letters are unavoidably held over.—ED.]

THE NATIONAL TELEPHONE STAFF BENEVOLENT SOCIETY.

THE first annual general meeting of this society was held at Salisbury House on Jan 24, 1907.

Owing to the absence of the president (Mr. R. J. Payne), the chair was taken by Mr. C. M. Bailey, vice-president. The balance sheet showed a balance of £101 3*s*. 3*d*. The secretary's report stated that there had been thirteen applications for assistance, of which four had been helped, the remainder proving on investigation that they did not come within the scope of the society's aid.

He further stated that up to the end of December, 1906, there were 1,540 members on the register.

Mr. Payne was again elected president for the ensuing year.

Vice-presidents elected were Messrs. Anns, C. M. Bailey, Cook, Elliott, Gill, Goddard, C. J. Phillips, and Sir Sydney Hoare, Bart. Mr. Leslie was chosen for the office of treasurer and Mr. Arthur T. Waller was again unanimously elected secretary. Messrs. Bryson, Davis, and L. Harvey Lowe are the trustees, and Messrs. A. Gray and A. J. Lacroix the auditors.

The arbitrators are old servants of the Company, viz., Messrs. Kipping, Arthur Thomson, Snowden, H. J. Waller, and Wormull.

The committee has been elected by departmental order, viz.:

Head Office represented by Mr. Dudley Stuart; *Metropolitan Superintendent, Chief Accountant and Service Department* by Miss Peet and Mr. Drabwell; *Construction Department* by Messrs. Greening and Warner; *Traffic Department* by Miss Ralph, Miss Minter, and Mr. Corner; *Maintenance Department* by Messrs. Ryall and A. Wright; *Stores* by Mr. H. Martin; *Workshop* by Mr. C. Kerridge; *Engineers* by Messrs. Hunt, Apply, and G. F. Brown.

Mr. Clay has made a very strong appeal to the members of the Metropolitan and Head Office staffs for their support in a circular letter which will be sent to everyone, and it is hoped they will join the society. The fund would then be approximately £225 per annum. This would enable the committee to make substantial grants and would effectually do away with the subscription lists which have hitherto opened to meet necessitous cases.

Votes of thanks to the chairman and retiring members of committee closed the proceedings.

INSTITUTION OF ELECTRICAL ENGINEERS.—The following transfers have been made:—Mr. W. W. Cook to M.I.E.E., and Mr. J. F. Edmonds to A.M.I.E.E. The following have been elected as A.M.I.E.E.:—Messrs. A. Watts and B. S. Cohen.

WHAT THE COMPANY IS DOING.

A NEW exchange has been opened at Cahir, in the Company's Dublin district, and amongst the exchanges which will shortly be working are Upholland and Ashton-in-Makerfield (South West Lancs.), and Epping and Harlow in Essex. The total number now open is 1,287, Birstal Exchange having been closed and the subscribers transferred to the new Batley Exchange; 3,072 stations were added during January, bringing the total up to 410,808.

LONDON.—Private branch exchange contracts have been completed with the following:—Alexandra Hotel, Harley House (Regents Park), Hotel Victoria, Midland Grand Hotel, First Avenue Hotel, Fleming's Hotel, Mexborough House, St. Ermin's Hotel, Brown's Hotel, Grosvenor Court, Grosvenor Hotel. These, with the installations mentioned in the past numbers of the JOURNAL, bring the total of hotel installations, recently arranged for London, up to 26, representing upwards of 4,000 stations, and there is every prospect of their showing a considerable increase in the near future.

LUTON.—The work of erecting six additional junction circuits (including three sections of dry core cable), and reconstructing the route between Luton and St. Albans, and of erecting one additional junction between St. Albans and Berkhamsted has just been completed, a route mileage of 28 miles and total wire mileage of 213 miles. A 24-line junction section and additional 100-line section has been authorised for Luton, and an additional 50-line board has been fitted at Boxmoor. Additions to existing boards at St. Albans also are in hand.

BRIGHTON DISTRICT.—A contract has been placed for the extension of underground work at Hastings, and also for the laying of underground work between Withdean Arch and the end of Patcham Village, Sussex, this latter exemplifying the enormous strides which our business has made during the last year or two in the Brighton area. The district through which this underground work is to be run being a purely country district in which until quite recently telephones were looked upon almost as curiosities.

BIRMINGHAM.—Agreements have been signed for private branch exchanges by the Midland Hotel Company, Limited (twelve stations), and the General Institution for the Blind, Birmingham (ten stations). The latter is to be used to teach the blind how to operate a subscriber's switchboard, and as this is the first essay in this direction a fuller account will be published when the scheme is in operation. Meanwhile, it may be interesting to know that a Birmingham firm employ a blind youth to operate a busy switchboard, and that his unqualified success has led to the above practical method of teaching.

EDINBURGH.—The laying of underground relief cables in the south side of the city has now been completed, and will be brought into use early in March. The total length of trench laid is 2,858 yards. The mileage of wire in cables being over 3,950 miles. Branch cables in Lauriston and Blackford districts are now almost completed, the underground mileage of wire being 790 miles and 33 miles respectively. Murrayfield relief cables are expected to be passed soon, the trench cut being 2,280 yards and the mileage of wire in cables 761 miles. The pipe work in connection with the underground scheme in Portobello is now practically completed, and it is anticipated that the cables will be drawn in at an early date. The conversion of Granton Exchange from overhead to underground has been started. The work in connection with the opening of a new exchange at South Queensferry, is now in hand. The conversion of exchange and exchange extension stations to common battery instruments is now in progress.

DUBLIN.—Two additional switchboard sections with equipment for 200 flat and message rate subscribers and 400 party line subscribers' transfer positions were recently completed in Dublin. The work of laying underground cables in Clontarf (Dublin) is at present being proceeded with. This work is necessary to enable overhead wires to be removed from the electric tramway trolley poles. Extensive schemes of underground cables in the residential districts of Pembroke and Rathmines (Dublin) have been submitted for approval, which have been rendered necessary owing to the extension of the Company's business and introduction of the measured rate tariffs. It is proposed to reopen the exchange at the latter suburb, and the scheme is at present in hand.

THAMES VALLEY DISTRICT.—One and a quarter miles of pipe have been laid at Ascot, and quarter-mile pipe and 300-pair cable laid at Maidenhead.

BRADFORD.—The contractors have taken in hand the work of enlarging the Company's Bradford premises, prior to the installation of a common battery switchboard.

PAISLEY.—Up to the present 7 miles 798 yards of underground cable have been drawn in. The cable chute for the exchange has been ordered, and it is to be hoped that this will be in position early in next month, when the work of joining will be begun. It is also hoped that a few of the subscribers will be joined through by the end of March.

BARRY.—Underground cables have been drawn in during this month as follows:—10-pair 48 yards, 25-pair 327 yards, 50-pair 114 yards.

PENARTH.—The following have also been drawn into the ducts:—150-pair 217 yards, 200-pair 259 yards.

NOTTINGHAM.—Mr. Hobbs of the Nottingham Contract Department has succeeded in obtaining orders for private branch exchanges from the two well-known firms of Messrs. J. Player & Sons, tobacco merchants, and Messrs. Boots, cash chemists. Each switchboard to be equipped for 50 extension instruments.

Beeston Underground Work.—Two thousand eight hundred yards of composite cable have been laid during the past month.

Hartley Road Underground Work.—Three-quarters of a mile of 600-pair 10-lb. cable have been drawn into the pipes.

Carlton Road Underground Work.—Five hundred yards of trenching and pipes have been dealt with, and men are busily employed in the centre jointing cables.

The changing of all the instruments on subscribers' direct lines and simple extensions at Nottingham to the common battery type; and an extension of underground work at Lincoln have been sanctioned by the Board.

NEWS OF THE STAFF.

LONDON.

Mr. A. W. EAMES, Assistant Engineer, Woolwich, resigned through ill-health.

Mr. G. TERRY, Wayleave Officer, has been made Assistant Engineer in place of Mr. Eames.

Mr. J. L. TAHOURDIN, Exchange Manager, Battersea, has been transferred to the Construction Staff.

Miss E. PITTARD, Operator, Paddington, has been made Supervisor, Kensington.

Miss V. COATES, Operator, Avenue, has been made Supervisor, Paddington.

Miss G. CLEVERLEY, Operator, Paddington, has been made Supervisor, Gerrard.

Miss E. TRINGHAM, Supervisor, Holborn, has been transferred as Supervisor to the Operating School (London Wall).

Miss A. BULL, Supervisor, London Wall, has been transferred to Holborn.

Miss L. WHITELEY, Supervisor, Hop, has been transferred to London Wall.

Miss L. YATES, Supervisor, Kensington, has been transferred to Hop.

PROVINCES.

Mr. J. H. WILSON, Local Manager, Nottingham, has been appointed District Manager at Luton.

Mr. R. H. GILLILAND, Switchboard Inspector, Dublin, has been promoted to the position of Assistant Chief Inspector; and Mr. S. A. VERSCHOYLE, Instrument Inspector, has taken up the duties of Switchboard Inspector.

Mr. F. C. SCANNELL, Instrument Inspector, Belfast, has been transferred to Londonderry.

Miss E. A. TROTT has been promoted to be Senior Supervisor, Brighton; Miss I. BONHAM from Monitor to Supervisor; and Miss M. AGUTTER from Senior Operator, Hove, to be Monitor at Brighton Central Exchange, these changes being consequent on the resignation of Miss White, who is about to get married.

Mr. WILLIAM MCPHAIL, Exchange Inspector, South Area, Glasgow, has been promoted to be an Assistant to the Traffic Superintendent.

Mr. JOHN P. ROSS was presented with a handsome kit bag and pocket book on the occasion of his transfer to Greenock district as Cost Clerk. Mr. Ross has been acting as Ledger Clerk in Glasgow.

Mr. W. L. SMITH, Fitter, Norwich, has been promoted to be Resident Inspector at Newmarket.

Miss A. ELLERY, has been appointed Supervisor, Swansea, vice Miss E. MERCHANT, resigned.

Mr. W. LAND has been promoted from Foreman to the position of Assistant Engineer at Luton.

Mr. J. A. BONATHAN has been transferred as Local Manager to Nottingham.

Mr. A. E. SMITH, late of Margate, has been transferred to the Guildford district and promoted to the position of Chief Instrument Inspector at the Aldershot centre.

MARRIAGES.

Miss GERTRUDE WALTON, Supervisor, Manchester Central Exchange, was married on Jan. 23, and prior to leaving the service was presented by her colleagues with a dinner service, trinket set, vases and several other useful and ornamental articles.

Miss E. E. SCHOFIELD, Operator, Rochdale, left the Company's service on Jan. 24, and was married on Feb. 6. Prior to her marriage she was the recipient of a dinner cruet, ornaments, a fruit dish, etc., subscribed for by the staff.

Miss LUCY SHAW, Supervisor, Manchester Central Exchange, resigned on Feb. 21, to be married.

Miss HAYES, operator at Hanley, has left the service to be married.

Mr. T. A. GOWLAND, Test Clerk, Middlesbrough, was recently presented by the Local Manager on behalf of the local and district office staff, with a pair of bronzes, on the occasion of his marriage.

Leaving to be Married—(London Operating Staff).

Miss B. M. ROUX, Operator, Bank.

Miss F. M. ALDRIDGE, Operator, Gerrard.

Miss M. CHARMAN, Exchange Clerk, Hop.

Miss H. D. SMITH, Operator, Hop.

Miss C. ASHMEAD, Operator, London Wall.

OBITUARY.

We regret to announce the following deaths:—

Mr. W. H. BOTLEY, of the Solicitors' Department, Head Office, on Feb. 2 after nearly ten years service with the Company.

Miss BESSIE MACKIE, Senior Operator, Manchester Central Exchange, on Jan. 28.

Mr. J. A. WEST, Counter Clerk, Salisbury House, London.

Mr. G. GRAY, Mechanics' Workshops, London.

Miss EDITH SMORTHIT, Operator, Leeds Central Exchange, on Jan. 25, of consumption, after an illness extending over several months. She was an excellent operator, and had been in the service since August, 1900. Her decease was much regretted.

Mr. JOHN CRUICKSHANKS, on Tuesday, Feb. 12, as the result of an accident. The deceased was a very old servant having entered the service in 1881. He was deservedly universally respected in the City where he had been stationed nearly four years in the position of Overseer of Line Faultfinders. Previously he was for many years in Aberdeen, Glasgow and other places in Scotland, where his loss will be generally regretted.

LOCAL TELEPHONE SOCIETIES.

London. The fourth meeting of the session was held at Salisbury House on Jan. 28, Mr. T. Fletcher presiding in the absence of the president, Mr. C. B. Clay. Mr. J. E. Kingsbury, of the Western Electric Company, read a paper entitled "Raw Material," and exhibited the various parts of a central battery instrument in its raw state. A discussion by various members followed, and the chairman having expressed the thanks of the society to Mr. Kingsbury, the meeting closed. We hope next month to publish Mr. Kingsbury's interesting paper in f[ull]."

Southern London.—The monthly meeting of the society was held on Feb. 13, a most instructive paper being read by Mr. G. H. Bryant on "Accumulators." The lantern, recently purchased by the society, was used for the first time, and the slides prepared, including a set kindly lent by the Engineer-in-Chief, proved most interesting. A miniature cell was inserted in the lantern, and the forming of plates practically illustrated. There was a very good attendance, and a discussion followed the reading of the paper.

Liverpool.—The fourth meeting of the session was held at the Common Hall, Hackins Hey, Liverpool, on Jan. 17. The provincial superintendent took the chair, and briefly introduced the lecturer, Mr. W. M. France, (Engineer-in-Chief's staff) who read a paper entitled "Common Battery Working." The lecturer illustrated his subject with numerous slides dealing principally with the design and arrangement of modern exchanges, and described several diagrams of standard circuits. Those were further supplemented by working models, illustrative of subscriber's line and junction circuits, which proved of great interest to all the members. Mr. France also exhibited some interesting statistics relative to the planning out of exchanges, and showed a standard designing form illustrative of building, description of plant, operators' quarters, etc. He explained these features at considerable length. Discussion, owing to length of the paper was necessarily brief, but well maintained, and the proceedings terminated at 10 p.m. after a hearty vote of thanks had been passed to the lecturer. Number of members present 75, being a percentage of 90 on the total.

Bradford.—The second meeting of this society was held on Dec. 19. There was a good attendance, the chair being taken by the president (Mr. H. B. Sutcliffe). A paper was read by Mr. W. J. Gray (local manager, Bradford), the subject being "Exchange Systems." By means of specially prepared diagrams various systems in use by the Company were explained, commencing with the self-restoring indicator system, then lamp signalling and clearing, party lines, generator call and automatic clear, call key and ring through systems, and automatic call-and-clear systems with double lamp supervision. An interesting discussion followed. The third meeting of the society was held on Jan. 18 (the chair being again taken by the district manager), when Mr. Gray continued the above subject, describing the working of a central battery exchange. A full complement of diagrams was exhibited (showing the line and cord circuit and junction circuit), and a description and diagrams showing how side tone is eliminated in these circuits. A series of diagrams was also shown for the benefit of the Fitting and Contract Department staff as to how extensions with no intercommunication were to be erected. A beneficial discussion also took place on these diagrams. On Feb. 8 the first portion of these lectures were given before a large and appreciative company of the combined staffs of Halifax, Huddersfield and Keighley, on the Halifax premises.

Sheffield.—A paper on "Central Battery Working" was read by Mr. J. Hyde at the fourth meeting of the present session, held on Jan. 23. The paper was illustrated with numerous lantern slides of diagrams and apparatus, and covered the main points of central battery working.

Swansea.—A meeting of the general society here was held on Feb. 11, when an interesting paper was given by Mr. G. Hey (contract agent) on "Our Business." There was an appreciative audience (the largest of the session, about 76 per cent. of the members being present), and an animated discussion ensued. The district manager (Mr. W. E. Gauntlett) presided.

Operators' Telephone Society.—A special meeting of the Swansea Operators' Telephone Society was held on Tuesday, Jan. 22, at the district office, when a lecture, illustrated by various diagrams, etc., was delivered by Mr. R. A. Dalzell, (P.S.) on "Traffic and Operating: How it affects and is affected by other Departments." Invitations had been issued to the various departments and there was a record attendance of about 80.

Hanley.—A meeting of this society was held on Jan. 18, when a paper was given by Mr. T. H. Schofield on "Operating Records and Traffic Returns." The paper dealt with the following points:—Section 1: Method of recording calls by ticket system, stroke system, and register systems. Comparison of the three systems for speed and accuracy. Cost of recording, including office work, loss of revenue due to inaccurate recording on ticket and stroke systems, in comparison with the extra cost of maintaining registers, showing that the advantage was on the side of the latter; that no system at present in existence obviated carelessness on the operator's part, and that to get over this failing the final solution of recording calls must be one where the recording is part of the connection of two subscribers. The new system adopted for measured rate subscribers being a ticket system, it was contended that whereas the ticket system is fairly accurate when dealing with a small percentage of calls such as trunk calls, it would become absolutely unwieldly and inaccurate in large centres. Section 2: Peg method of counting for traffic returns described together with Veeder method of registration of calls. Discussed the valuation of calls as allowed and showed that the party line operator and flat rate operator, while reckoned equal had considerably different duties. The system of compiling curves was explained together with the uses to which they can be adapted, including arrangement of operating duties. Another curve shown whereby the distribution of subscribers and the teamwork of the operating could be watched. An interesting discussion took place at the end of the paper on automatic recording.

Hull.—For the benefit of the staff in the district a mathematics class has been commenced. Meetings are held every Monday in the district office and a fully qualified master has been appointed as tutor. About 40 members of the staff have availed themselves of it.

Dublin.—The eighth meeting of the session was held on Jan. 21, Mr. F. Cowley, provincial superintendent, being in the chair. Miss A. Duggan read a paper entitled "Operators in Training," illustrated by lantern slides, describing the training of an operator for six months. The advisability of reserving a quiet section for learners, and starting an operators' school, and the question of subscribers using obsolete directories, were discussed; and the meeting closed with a vote of thanks to Miss Duggan; 41 members of the staff were present. The ninth meeting of the session was held on Feb. 4, Mr. E. J. Jarrett, local manager, being in the chair. Mr. J. W. Hobson read a paper on "Overhead Construction," dealing with the method of preserving, erecting, staying and arming poles. A discussion ensued with regard to the best way in which to run wires, whether that adopted in America or the British; also as to whether it was more satisfactory to use a winch or luff tackle for lifting poles when using a derrick; and as to staying derricks and terminating bronze wire The meeting closed with a vote of thanks to Mr. Hobson; 28 members of the staff were present. A very instructive paper on "Testing" was read by Mr. D. Kirkwood, test clerk, Dublin, on Feb. 18, which was illustrated by diagrams. An explanation of the functions of the Silvertown and Wheatstone testing sets was much appreciated. A feature of our telephone society is that non-members are invited to attend any meeting which they think would be instructive to them.

Glasgow and West of Scotland District.—The sixth meeting of the session was held on Jan. 30 in the Glasgow Technical College, when Mr. J. W. Warnock read a paper entitled "Testing Cables and Open Wires." After describing the various processes of testroom work, Mr. Warnock proceeded by means of diagrams to show some of the different types of apparatus in use in Glasgow, and afterwards exhaustively described the actual work of testing cables and open wires, his descriptions being amplified on the blackboard. At the close of the lecture a number of points were raised by members and Mr. Warnock duly replied. A hearty vote of thanks was accorded the lecturer for his interesting paper. The seventh meeting of the session was held in the Technical College on the evening of Feb. 13, when Mr. Herbert Laws Webb lectured on "Telephony on the Continent of Europe." Mr. Valentine presided over an attendance of 160. In introducing Mr. Webb, the chairman referred to the lecturer's wide experience in telephone matters, and took the opportunity of thanking him in the name of the Glasgow staff for the great assistance rendered by him from time to time. After asking whether it was by design that his lecture had been fixed for the 13th of the month and Ash Wednesday, Mr. Webb proceeded to show the extent of telephone development in America and in the principal towns of various European countries, and accounted for the large development and rapid growth in some and the small development and slow progress in others. By means of excellent lantern slides he showed specimens of the plant, outside and inside, used in various continental and American towns, and explained the methods of working.

Brighton.—On Feb. 14 Mr. P. C. Langridge gave a lecture on "Testing Instruments and their Uses," and on Feb. 18, Mr. F. W. Roberts lectured on "Dynamos." On each occasion the attendance was good and the interest well sustained. Owing to the removal of Mr. H. Legge, honorary secretary of this society, Mr. O. S. Flower has been elected to take over these duties.

Birmingham.—A lecture was given on Feb. 1 by Mr. B. S. Cohen, of the Engineer-in-Chief's Department, London, the subject being "Transmission Experiments." Mr. A. Coleman presided. There were also present Mr. A. E. Cotterell, assistant provincial superintendent; Mr. G. Hooper, district manager; Mr. A. W. Smith, Wolverhampton; Mr. E. Williamson, Nottingham; Mr. J. Mewburn, Coventry; and about 90 members of the Birmingham staff. The various points were lucidly explained by the lecturer and although the matter dealt with was of a highly technical nature the greatest interest was taken in it by everyone. The successful experiments on the oscillograph, and the lantern slides which illustrated the subject no doubt proved a material factor in enabling the audience to follow the lecturer in some of the most interesting, yet intricate, parts of his subject, but the hearty applause of those present was proof that he had not only got a grip of the technical side of the question but could impart it in a clear and concise manner.

Coventry.—A meeting of the South Midland District Telephony Society was held at the Priory Assembly Rooms, Coventry, on Feb. 18, when Mr. John Mewburn presided over an attendance of 30. A paper was read by by Mr. S. H. Ings on "Transmission of Speech." The paper which was of an abstruse nature was illustrated by means of a reflecting galvanometer. Discussion was freely entered into and several questions were asked.

Blackburn.—The sixth meeting of the session was held in the Weavers' Association Rooms, Blackburn, on Feb. 15, Mr. Remington being in the chair. An alteration was made in the syllabus, and instead of Mr. Frost's paper, Mr. Brown, the contract agent, read a paper on "Old and New Tariffs: How they Affect Existing and New Subscribers." The subject was dealt with in a clear and

convincing manner, and was followed by a most interesting discussion. At the finish Mr. Brown was cordially thanked by the members. The attendance numbered 52, or 63 per cent.

Oldham.—The meeting of the local society was held on Jan. 31, when Mr. W. B. Cheetham (chief electrician, Oldham) read the sixth paper of the session on "Electric Light and Power Distribution." Although not directly dealing with telephony, it was nevertheless highly instructive, seeing that the Company is putting in so many power boards. Mr. Cheetham showed some very interesting samples of bad workmanship which had been the cause of fires, thus pointing out how very essential it is to pay attention to every detail. The next paper will be read by Mr. T. S. Bowes (engineer, Oldham) on Feb. 21, on "Underground Construction."

Manchester.—On Feb. 8 the usual fortnightly meeting was held in the Empire Cafe, Mr. Shepherd presiding. On the same date Mr. Goddard, accompanied by Mr. H. Laws Webb, held a conference with the superintendent, district managers and contract agents of the North-West Province, and the members of the society were gratified to have them join in our evening meeting. Mr. Prout, the assistant superintendent, lectured on "Telephonic Retrospect and Prospect." The early discoveries of Oersted, Faraday, Morse, Reiss, Graham, Bell and Elisha Gray were noted in rapid review, as were also the applications and development of telephony from these early days right up to the present times of dry core cables and central battery equipments. The lecture was made of great local interest by the lecturer's dealing with the development of telephony in Manchester district, and showing portraits of many of those who had been concerned in its control and management. The portraits included Mr. Gaine, Mr. Goddard, Mr. Claxton, Mr. Joseph Chambers, Mr. Shepherd, Mr. Prout and Mr. Scott. Other slides exhibited gave excellent views of the Company's present premises, and also of the new switchroom and offices now in course of construction. Mr. Goddard and Mr. Laws Webb supplemented Mr. Prout's remarks, and the usual votes of thanks were proposed by Mr. Magnall and Mr. Taylor, the latter having served under all the gentlemen whose portraits had been shown. The attendance was good, and included several ladies from the operating staff.

STAFF GATHERINGS AND SPORTS.

London.—*C. B. Clay Football Challenge Cup Competition.* The final match for the season 1906-7 was played in the Wimbledon Park Polo Club grounds at Southfields on Feb. 9, the districts successful in reaching this stage being the Western and Salisbury House (holders.) The turf was in a rather soft condition, but both teams were strongly represented and the result of a fast and closely contested game was a victory for Salisbury House by 4 goals to 1. The Western team was captained by Mr. A. S. Stowell, and Salisbury House by Mr. A. E. Wild, who has now played with the winning team for five years in succession, and undoubtedly much of the credit for the last four years is due to his able captaincy.

London.—*Avenue Conversazione.*—There was a gay assembly at the Council Chamber, Shoreditch Town Hall, on the night of Feb. 16, when a *conversazione* was given by the Avenue staff in honour of Mr. W. B. Benham, who has recently been transferred to London Wall. A very attractive programme had been drawn up, and a most enjoyable evening was spent by those present, who numbered about 180 of the Avenue staff and their friends. Among the guests were Messrs. C. B. Clay, J. F. Edmonds, and L. Harvey Lowe. The entertainment included a humorous recitation by Mr. Deane, composed by Mr. Corner, and two performances in a very brilliant style by the "Avenue" string band. An item of the programme which caused a great deal of enjoyment was the excellent rendering of a sketch "Their New Paying Guest," by five members of the Avenue operating staff—Misses L. Bailey, C. Flinn, M. Horton, A. Minns and E. Orme. The most important event of the evening was the presentation of an illuminated address to Mr. Benham, together with a Chippendale music cabinet, and hearty cheers witnessed to his popularity during his twelve and a half years' service at the Avenue. Games and dancing occupied the rest of the evening, concluding with "Sir Roger de Coverley," the proceedings being brought to a close at 11 p.m. by the singing of Auld Lang Syne. With the exception of Miss L. Goodway, the whole of the ladies contributing to the excellent programme belonged to the Avenue staff, the supervisors, clerks, and a few senior operators performing the duties of stewards, those of M.C. being undertaken by Miss Minter. Mr. Meldrum officiated at the piano.

Metropolitan Staff Dinner.—The committee announce that the annual Metropolitan staff dinner will take place at the Holborn Restaurant (Royal Venetian Chamber), on Friday, March 15, Mr. C. B. Clay in the chair. Applications should be made early to any of committee.

Western District.—On Feb. 14 a supper, followed by a smoking concert, took place at the Swiss Hotel, Old Compton Street, at which Mr. James Robertson was presented, on the occasion of his transfer from the Western to the Northern district, with a gold chain by his colleagues in the Western district.

Norwich.—A whist drive was held at the Criterion Restaurant on Feb. 18, to which friends were invited, and a party of about 40 were present. The first prize, a brass clock, was won by Mr. Harry Barnes, a visitor, and the booby prize, a doll, by Mr. A. W. Bell, canvasser. During a very enjoyable evening songs were rendered by Mr. Fawcett and a pianoforte solo by Mr. H. J. Herink.

Glasgow.—*Argyle Exchange.*—On Feb. 15 the staff of this exchange spent a very enjoyable evening in the Masonic Halls, Berkeley Terrace, when a programme of songs, readings and dancing was carried through with great success. There were 115 present.

Hillhead Exchange.—The staff of this exchange and friends held their "At Home" in the Academy Rooms, Partick, on Jan. 30. There were 50 couples present, and a most enjoyable evening was spent.

Middlesbrough.—The annual dance was held on Feb. 8 in the Co-operative Hall. A most enjoyable evening was spent by the members and their friends present, numbering about 80, dancing being indulged in till 2 a.m.

Oldham.—The third annual whist drive and dance of the south-east Lancashire staff and their friends was held at the Reform Club, Oldham, on Jan. 26. There were 62 present. The National Telephone staff held their own in the whist drive taking four out of the six prizes given.

Leeds.—The Northern Province have been presented by their superintendent with a very handsome silver challenge cup, for competition amongst the five districts in that province. A resolution was passed in committee that Mr. J. C. Chambers be informed of the appreciation of the gift felt by the staff, and steps have already been taken with a view to making the competition a great success. The draw for the cup is as follows:—Mid-Yorks v. West-Yorks, Newcastle v. Durham, East Yorks, a bye.

Paisley.—The members of the staff at this centre met for the first time in a social capacity in the Co-operative Hall, Bank Street, Paisley, on the evening of Jan. 22. The chair was taken by the local manager, Mr. Audsley, and he, in a few remarks stated that although this was the first gathering, he hoped it would not be the last, seeing the success which had attended the efforts of the committee in carrying out the work. During the evening songs were contributed by Misses McFarlane, Baillie and Congalton, and Messrs. Baillie, Tait, Mackie and Gibson, and a reading by Mr. McStravick. Dancing was entered into with spirit, and the entertainment broke up in the "wee sma' oors o' th' mornin'," everyone voting the function a most successful one.

Swansea.—A successful smoking concert was held at the Mackworth Hotel on Friday, Feb. 1, in connection with the Swansea district staff. About 90 were present. The district manager (Mr. W. E. Gauntlett) presided, and he was supported by the local manager (Mr. R. Williamson) in the vice-chair. A most enjoyable evening was spent, the entire programme being made up and carried out in excellent fashion by various members of the staff. Messrs. J. Radford, C. A. Bevan and W. H. Jones proved themselves capable organisers.

Bath.—On Feb. 2 the members of the staff arranged and carried out amongst themselves an excursion to Bristol. Reaching there at about four o'clock in the afternoon, the New Art Gallery, recently presented to the city by Sir W. H. Wills, was made for. Time would only permit of a hurried glance through this magnificent building. After tea the evening was occupied by a visit to the Prince's Theatre, where seats had been previously booked for the Pantomine "Humpty Dumpty."

Wolverhampton.—The district staff held their annual ball and whist drive on Feb. 15 at the Central Hall, Wolverhampton; 150 were present including the district manager (Mr. A. W. Smith) and Mrs. Smith, Mr. and Mrs. Redhead of Wolverhampton, Mr. and Mrs. Burgess, Dudley, Mr. Watts, Engineer-in-Chief's Department, Mr. Edgar, Wolverhampton, and Mr. Grosvenor, Walsall.

Nottingham.—The district staff received a visit from many members of the Sheffield district staff on Feb. 2, and a football match took place between two teams selected from the staffs. After a good game Nottingham were victorious by two goals to one. The Sheffield staff were entertained at tea by Nottingham, and afterwards inspected the common battery exchange equipment in use at Nottingham. At a meeting of the staff held in the local office on Feb. 13 it was unanimously decided to form a cricket club. The district office staff held a whist drive at the Arboretum Rooms, Nottingham, on Wednesday, Jan. 23. A most enjoyable evening was spent, the visitors including representatives from the Nottingham factory and Messrs. British L. M. Ericsson's staffs.

Leeds.—The cricket club held a smoking concert on Feb. 8 at the Golden Lion Hotel. The following artists contributed to the evening's enjoyment:—F. Leffler (bass), G. H. Gould (baritone), C. H. Crawshaw (violin), G. Nicoll (clarionet), A. Sunderland (cornet), W. Heywood (tenor), T. M. Currie (tenor), J. F. Harrison (baritone), A. H. Taylor (humorist), G. Gaunt (comic), J. Proctor (comic), H. Longcake (accompanist). A very enjoyable evening was spent, and the club funds benefited very successfully, whilst it is very satisfactory to say the programme was practically filled from the Company's employees.

Greenock.—The staff and their friends held an "At Home" in the Waverley Temperance Hotel last evening, the chair being occupied by Mr. J. A. Swanson. During the evening a presentation was made to Mr. Douglas Fowler, who has been promoted to the position of engineer in the Company's Ayrshire district. Mr. A. Wilson, in presenting Mr. Fowler with a silver spirit kettle, congratulated him on his appointment, and wished him every success. Another gathering was held in the district—the occasion being the transfer of Mr. James Leitch, late chief clerk, who is leaving Greenock to take up the position of cashier at Edinburgh. Mr. Archibald on behalf of the staff presented Mr. Leitch with a marble timepiece and bronze ornaments, at the same time conveying to Mr. Leitch their best wishes for his future success.

Hanley.—The first annual dance and *conversazione* in connection with the staff was held at the Grand Hotel on Jan. 31. All the various departments were represented, and there were about 140 present. An excellent programme was arranged, and dancing was carried on from 8 p.m. until the early hours of the morning. The duties of M.C. was admirably undertaken by Mr. T. H. Schofield, who was assisted by the stewards, Messrs. J. W. Barnett and T. M. Woodyatt. The committee are to be congratulated on the success which attended their efforts as the dance was a most enjoyable one. Among those present were Mr. A. E. Ruddock, district manager, Mr. France, Post Office engineer, and Messrs. S. E. Goodwin, F. Gresswell and W. E. Hurlbut Stafford.

Edinburgh.—The district staff held a whist drive on the evening of Jan. 22. Fourteen tables were occupied and play was engaged in for about two hours. Tea was served by the ladies, and Mrs. Stewart, wife of the district manager, afterwards presented the prizes to the winners.

Exeter.—On Thursday, Jan. 31, the staff held its annual dance and social evening at the Royal Public Rooms. The attendance numbered about 120, there being representatives from Torquay, etc., present. Games, a whist drive, etc., were indulged in, but the special feature of the evening was dancing, the dancers voting it one of the most enjoyable of the season. The arrangements were in the hands of Miss Campbell, Miss Heaps, and Messrs. Bennett, Humphries, Sim, and Squire; much of the success of the evening however was due to Mr. Distin, the district manager, who was an efficient M.C.